



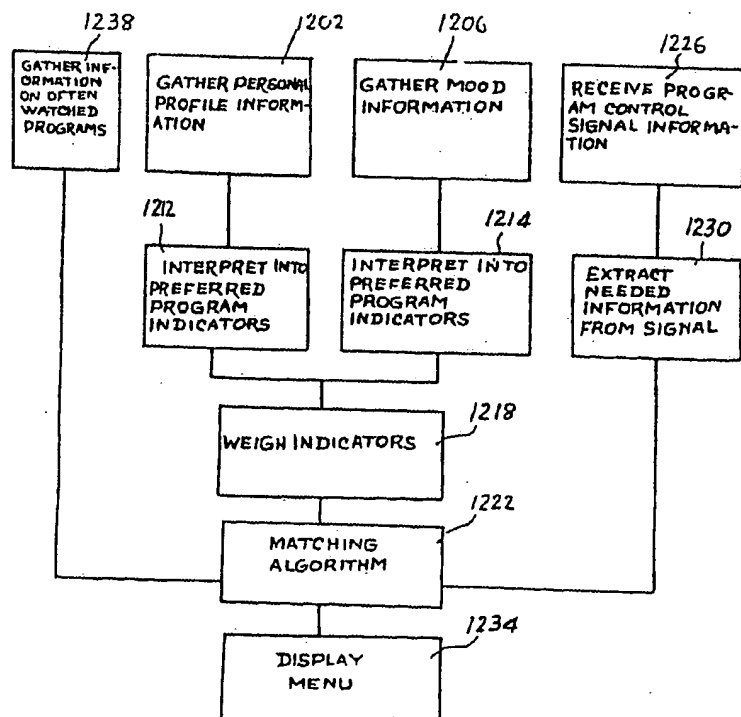
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(54) Title: REPROGRAMMABLE TERMINAL FOR SUGGESTING PROGRAMS OFFERED ON A TELEVISION PROGRAM DELIVERY SYSTEM

(57) Abstract

A novel reprogrammable set top terminal (220) for a television program delivery system (200) which suggests programs for viewing is described. The invention relates to methods and apparatus for reprogramming set top terminals (220), and selecting and displaying programs to suggest to subscribers for viewing. The invention is particularly useful in television program delivery systems (200) with hundreds of channels of programming, a menu driven program selection system, and a program control information signal which carries data and identifies the available program choices. Specifically, the invention relates to remote reprogramming of terminal memory and the gathering and analysis of data for selecting programs to suggest to a subscriber. The invention is a terminal which includes a means for receiving incoming signals, a processor (602), memory, and a means to generate menu screens for display on a TV or monitor. Various data gathering and analysis techniques are used to customize selection of programs for display on a menu.



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**REPROGRAMMABLE TERMINAL FOR SUGGESTING
PROGRAMS OFFERED ON A TELEVISION PROGRAM
DELIVERY SYSTEM
RELATED APPLICATIONS**

5 This application is a continuation-in-part of application
Serial Number 07/991,074 filed December 9, 1992 entitled
TELEVISION PROGRAM PACKAGING AND DELIVERY
SYSTEM WITH MENU DRIVEN SUBSCRIBER ACCESS. The
10 following other continuation-in-part applications, also based
on the above-referenced patent application, are incorporated
herein by reference:

Ser. No. 08/160,280, PCT/US93/11616, entitled NETWORK
CONTROLLER FOR CABLE TELEVISION DELIVERY
SYSTEMS, filed December 2, 1993;

15 Ser. No. 08/160,282, PCT/US93/11617, entitled AN
OPERATIONS CENTER FOR A TELEVISION PROGRAM
PACKAGING AND DELIVERY SYSTEM, filed December 2,
1993;

20 Ser. No. 08/160,193, PCT/US93/11618, entitled SET-TOP
TERMINAL FOR CABLE TELEVISION DELIVERY SYSTEMS,
filed December 2, 1993;

Ser. No. 08/160,194, PCT/US93/11606, entitled ADVANCED
SET-TOP TERMINAL FOR CABLE TELEVISION DELIVERY
SYSTEMS, filed December 2, 1993;

25 Ser. No. 08/160,283, PCT/US93/11615, entitled DIGITAL
CABLE HEADEND FOR CABLE TELEVISION DELIVERY
SYSTEM, filed December 2, 1993

BACKGROUND OF THE INVENTION

30 The invention relates to television entertainment
systems for providing television programming to consumer
homes. More particularly, the invention relates to a user
friendly system for providing consumers with television
programming choices.

35 Advances in television entertainment have been
primarily driven by breakthroughs in technology. In 1939,
advances on Vladimir Zworykin's picture tube provided the
stimulus for NBC to begin its first regular broadcasts. In

1975, advances in satellite technology provided consumers with increased programming to homes.

Many of these technology breakthroughs have produced inconvenient systems for consumers. One example is the ubiquitous three remote control home, having a separate and unique remote control for the TV, cable box and VCR. More recently, technology has provided cable users in certain parts of the country with 100 channels of programming. This increased program capacity is beyond the ability of many consumers to use effectively. No method of managing the program choices has been provided to consumers.

Consumers are demanding that future advances in television entertainment, particularly programs and program choices, be presented to the consumer in a user friendly manner. Consumer preferences, instead of technological breakthroughs, will drive the television entertainment market for at least the next 20 years. As computer vendors have experienced a switch from marketing new technology in computer hardware to marketing better useability, interfaces and service, the television entertainment industry will also experience a switch from new technology driving the market to consumer useability driving the market.

Consumers want products incorporating new technology that are useful, and will no longer purchase new technology for the sake of novelty or status. Technological advances in sophisticated hardware are beginning to surpass the capability of the average consumer to use the new technology. Careful engineering must be done to make entertainment products incorporating new technology useful and desired by consumers.

In order for new television entertainment products to be successful, the products must satisfy consumer demands.

TV consumers wish to go from limited viewing choices to a variety of choices, from no control of programming to complete control. Consumers wish to advance from cumbersome and inconvenient television to easy and convenient television and keep costs down. Consumers do not wish to pay for one hundred channels when due to lack of programming information, they seldom, if ever, watch programming on many of these channels.

The concepts of interactive television, high definition television and 300 channel cable systems in consumer homes will not sell if they are not packaged, delivered and presented in a useable fashion to consumers. The problem is that TV programming is not being presented to consumers in a user friendly manner.

Consumers are already being bombarded with programming options, numerous "free" cable channels, subscription cable channels and pay-per-view choices. Any further increase in TV entertainment choices, without a user friendly presentation and approach, will likely bewilder viewers with a mind-numbing array of choices.

What is needed is an economical system which can present television programs through a user friendly interface which allows the consumer to easily select from among the many program choices.

What is needed is a system that assists the consumer with his program selection.

What is needed is a reprogrammable system for presenting program choices.

What is needed is a system which can be remotely reprogrammed.

What is needed is a system capable of handling hundreds of programs in different formats, be expandable for

future types of programming and be inexpensive. The present invention is addressed to fulfill these needs.

SUMMARY OF INVENTION

5 This invention is a reprogrammable terminal for television program delivery systems which is capable of suggesting programs for viewing. Specifically, the present invention may be remotely reprogrammed and is capable of assisting a subscriber in selecting television programs by
10 suggesting programs for viewing. This is a particularly useful invention for television program delivery systems with hundreds of channels of programming and a menu driven program selection system.

15 Preferably the terminal is located at the television set top and is used with a television delivery system that includes a program control information signal which carries data and identifies the available program choices. The terminal includes means for receiving incoming signals, a processor, memory and means to generate menu screens for display on
20 a TV or monitor.

25 The terminal can be remotely reprogrammed using an incoming signal. Preferably a software interrupt followed by a memory location or software line number is transmitted via an incoming signal. This is followed by the new software programming which is written into memory at the set top terminal. Using this method, basic programming as well as menu formats, templates, logos, colors etc. may be changed.

30 The terminal of the present invention can also help a subscriber in selecting programs by suggesting programs to the subscriber. The terminal suggests programs that the subscriber is most likely to watch. The terminal is capable of applying several methods of analysis and a variety of

informational sources to solve the problem of choosing a program that the subscriber is most likely to watch. For example, responsive and "intelligent" methods of analysis may be used with mood, personal profile, and historical program watched and network watched data.

Responsive methods of analysis require a subscriber to respond to a variety of questions or select subjective adjectives from program driven menus. The terminal will pose the questions or lists of subjective entries using menus and the subscriber will respond using a user interface, usually an alpha-numeric remote control. For example, subscriber preferences in mood, type of program, category/genre, actor, year preference and standard rating can be selected from menus as search entries. These entries, or key words which correlate to the entries, will be used to search a program database consisting of abstracts of a multitude of programs. The search results in a list of programs which can be displayed to the user.

Intelligent methods "learn" the subscribers viewing choices through analysis of historical data generally gathered by the terminal in a passive mode.

Through a series of analysis and weighing algorithms, the terminal is able to suggest groups of programs. A menu display of the suggested programs is offered to the subscriber. Within the suggested group of programs, the terminal can also prioritize the programs and determine each programs menu position.

It is an object of the invention to provide a user friendly interface for subscribers to access television programs.

It is an object of this invention to assist viewers in choosing programs.

It is an object of this invention to allow subscribers to select a program from among hundreds of choices without a television viewing guide.

5 It is an object of this invention to suggest program selections to viewers.

It is an object of this invention to monitor subscriber viewing choices.

It is an object of this invention to provide a system which can be reprogrammed.

10 It is an object of this invention to provide a system which can be remotely reprogrammed.

It is an object of this invention to provide a system which can handle many television programs and menu selection of programs.

15 These and other objects and advantages of the invention will become obvious to those skilled in the art upon review of the following description, the attached drawings and appended claims.

20

DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagram of the primary components of the television delivery system.

Figure 2 is an overview of the television delivery system operations.

25 Figure 3 is a schematic of the operation of the primary components of the system.

Figure 4 is a block diagram of the hardware components of the set top terminal.

30 Figure 5a is a perspective front view of a set top terminal.

Figure 5b is a perspective rear view of a set top terminal.

Figure 6 is a schematic of a Turbo card upgrade for a set top terminal.

Figure 7a is a drawing of a frame format for a program control information signal.

5 Figure 7b is a drawing of a frame format for a polling response from the set top terminal.

Figure 8 is a drawing of the basic menus used in the present invention, including ten major menus represented by icons.

10 Figure 9a is a drawing of storage for on-screen menu templates and other graphics files stored in graphics memory of the set top terminal.

Figure 9b is a drawing showing the hierarchical storage of text in memory for the set top terminal.

15 Figure 9c is a drawing of a flow chart showing the steps required for the microprocessor to retrieve, combine and display a menu.

Figure 10a and 10b are schematics of memory structures for reprogramming the set top terminal.

20 Figure 11a is a drawing of the main menu used for suggesting programs based on viewer responses.

Figures 11b, 11c, 11d and 11e are drawings of submenus used for suggesting programs based on user responses.

25 Figures 12a and 12b are drawings of a broadcast television menu and submenu.

Figures 12c, 12d and 12e are drawings of mood question menus.

30 Figure 13a is a drawing of a method for selecting programs for display.

Figure 13b is a drawing of a more detailed method for selecting programs for display.

Figure 14 is a drawing of a movie ordering/preview menu.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A. Television Program Delivery System Description

1. Introduction

Figure 1 shows the present invention as part of an expanded cable television program delivery system 200 that dramatically increases programming capacity using compressed transmission of television program signals. Developments in digital bandwidth compression technology now allow much greater throughput of television program signals over existing or slightly modified transmission media. The program delivery system 200 shown provides subscribers with a user friendly interface to operate and exploit a six-fold or more increase in current program delivery capability.

Subscribers are able to access an expanded television program package and view selected programs through a menu-driven access scheme that allows each subscriber to select individual programs by sequencing a series of menus. The menus are sequenced by the subscriber using simple alpha-numeric and iconic character access or moving a cursor or highlight bar on the TV screen to access desired programs by simply pressing a single button, rather than recalling from memory and pressing the actual two or more digit numeric number assigned to a selection. Thus, with the press of a single button, the subscriber can advance from one menu to the next. In this fashion, the subscriber can sequence the menus and select a program from any given menu. The programs are grouped by category so that similar program offerings are found on the same menu.

2. Major System Components

In its most basic form, the system uses a program delivery system 200 in conjunction with a conventional concatenated cable television system 210. The program delivery system 200 generally includes (i) at least one operations center 202, where program packaging and control information are created and then assembled in the form of digital data, (ii) a digital compression system, where the digital data is compressed, combined/multiplexed, encoded, and mapped into digital signals for satellite transmission to the cable headend 208, and (iii) a set of in-home decompressors. The program delivery system 200 transports the digital signals to the cable headend 208 where the signals are transmitted through a concatenated cable television system 210. Within the cable headend 208, the received signals may be decoded, demultiplexed, managed by a local central distribution and switching mechanism, combined and then transmitted to the set top terminal 220 located in each subscriber's home over the cable system 210. Although concatenated cable systems 210 are the most prevalent transmission media to the home, telephone lines, cellular networks, fiberoptics, Personal Communication Networks and similar technology for transmitting to the home can be used interchangeably with this program delivery system 200.

The delivery system 200 has a reception region 207 with an in-home decompression capability. This capability is performed by a decompressor housed within a set top terminal 220 in each subscriber's home. The decompressor remains transparent from the subscriber's point of view and allows any of the compressed signals to be demultiplexed and individually extracted from the composite data stream and then individually decompressed upon selection by the subscriber. The decompressed video signals are converted

into analog signals for television display. Such analog signals include NTSC formatted signals for use by a standard television. Control signals are likewise extracted and decompressed and then either executed immediately or placed in local storage such as a RAM. Multiple sets of decompression hardware may be used to decompress video and control signals. The set top terminal 220 may then overlay or combine different signals to form the desired display on the subscriber's television. Graphics on video or picture-on-picture are examples of such a display.

Although a single digital compression standard (e.g., MPEG) may be used for both the program delivery system 200 and the concatenated cable system 210, the compression technique used may differ between the two systems. When the compression standards differ between the two media, the signals received by the cable headend 208 must be decompressed before transmission from the headend 208 to the set top terminals 220. Subsequently, the cable headend 208 must recompress and transmit the signals to the set top terminal 220, which would then decompress the signals using a specific decompression algorithm.

The video signals and program control signals received by the set top terminal 220 correspond to specific television programs and menu selections that each subscriber may access through a subscriber interface. The subscriber interface is a device with buttons located on the set top terminal 220 or on a portable remote control 900. In the preferred system embodiment, the subscriber interface is a combined alpha-character, numeric and iconic remote control device 900, which provides direct or menu-driven program access. The preferred subscriber interface also contains cursor movement and go buttons as well as alpha,

numeric and iconic buttons. This subscriber interface and menu arrangement enables the subscriber to sequence through menus by choosing from among several menu options that are displayed on the television screen. In addition, a user may bypass several menu screens and immediately choose a program by selecting the appropriate alpha-character, numeric or iconic combinations on the subscriber interface. In the preferred embodiment, the set top terminal 220 generates the menus that are displayed on the television by creating arrays of particular menu templates, and the set top terminal 220 displays a specific menu or submenu option for each available video signal.

3. Operations Center and Digital Compression System

The operations center 202 performs two primary services, packaging television programs and generating the program control information signal. At the operations center 202, television programs are received from external program sources in both analog and digital form. Figure 2 shows an embodiment of the operations center receiving signals from various external sources 212. Examples of the external program sources are sporting events, children's programs, specialty channels, news or any other program source that can provide audio or visual signals. Once the programs are received from the external program sources, the operations center 202 digitizes (and preferably compresses) any program signals received in analog form. The operations center 202 may also maintain an internal storage of programs. The internally stored programs may be in analog or digital form and stored on permanent or volatile memory sources, including magnetic tape or RAM. Subsequent to receiving programming, the operations center 202 packages the

programs into the groups and categories which provide the optimal marketing of the programs to subscribers. For example, the operations center 202 may package the same programs into different categories and menus for weekday, prime-time viewing and Saturday afternoon viewing. Also, the operations center 202 packages the television programs in a manner that enables both the various menus to easily represent the programs and the subscribers to easily access the programs through the menus.

The packaging of the digital signals is typically performed at the operations center 202 by computer assisted packaging equipment (CAP). The CAP system normally includes at least one computer monitor, keyboard, mouse, and standard video editing equipment. A programmer packages the signals by entering certain information into the CAP. This information includes the date, time slot, and program category of the various programs. The programmer and the CAP utilize demographic data and ratings in performing the packaging tasks. After the programmer selects the various programs from a pool of available programs and inputs the requisite information, the programmer, with assistance from the CAP, can select the price and allocate transponder space for the various programs. After the process is complete, the CAP displays draft menus or program schedules that correspond to the entries of the programmer. The CAP may also graphically display allocation of transponder space. The programmer may edit the menus and transponder allocation several times until satisfied with the programming schedule. During the editing, the programmer may direct the exact location of any program name on a menu with simple commands to the CAP.

The packaging process also accounts for any groupings by satellite transponder which are necessary. The operations center 202 may send different groups of programs to different cable headends 208 and/or set top terminals 220. One way the operations center 202 may accomplish this task is to send different program packages to each transponder. Each transponder, or set of transponders, then relays a specific program package to specific cable headends 208 and/or set top terminals 220. The allocation of transponder space is an important task performed by the operations center 202.

The operations center 202 may also "insert" directions for filling local available program time in the packaged signal to enable local cable and television companies to fill the program time with local advertising and/or local programming. Consequently, the local cable headends 208 are not constrained to show only programs transmitted from the operations center 202. New set top converters will incorporate both digital and analog channels. Therefore, the cable headend 208 may combine analog signals with the digital signals prior to transmitting the program signals to the set top terminals 220.

After the CAP packages the programs, it creates a program control information signal to be delivered with the program package to the cable headend 208 and/or set top terminal 220. The program control information signal contains a description of the contents of the program package, commands to be sent to the cable headend 208 and/or set top terminal 220, and other information relevant to the signal transmission.

In addition to packaging the signal, the operations center 202 employs digital compression techniques to

increase existing satellite transponder capacity by at least a 4:1 ratio, resulting in a four-fold increase in program delivery capability. A number of digital compression algorithms currently exist which can achieve the resultant increase in capacity and improved signal quality desired for the system. The algorithms generally use one or more of three basic digital compression techniques: (1) within-frame (intraframe) compression, (2) frame-to-frame (interframe) compression, and (3) within carrier compression. Specifically, in the preferred embodiment, the MPEG 2 compression method is used. After digital compression, the signals are combined (multiplexed) and encoded. The combined signal is subsequently transmitted to various uplink sites 204.

There may be a single uplink site 204 or multiple uplink sites (represented by 204', shown in phantom in Figure 1) for each operation center 202. The uplink sites 204 may either be located in the same geographical place or may be located remotely from the operations center 202. Once the composite signal is transmitted to the uplink sites 204, the signal may be multiplexed with other signals, modulated, upconverted and amplified for transmission over satellite. Multiple cable headends 208 may receive such transmissions.

In addition to multiple uplinks, the delivery system 200 may also contain multiple operations centers. The preferred method for using multiple operations centers is to designate one of the operations centers as a master operations center and to designate the remaining operations centers as slave operations centers. In this configuration, the master operations center coordinates various functions among the slave operations centers such as synchronization of

simultaneous transmissions and distributes the operations workload efficiently.

4. Cable Headend

After the operations center 202 has compressed and encoded the program signals and transmitted the signals to the satellite, the cable headend 208 receives and further processes the signals before they are relayed to each set top terminal 220. Each cable headend site is generally equipped with multiple satellite receiver dishes. Each dish is capable of handling multiple transponder signals from a single satellite and sometimes from multiple satellites.

As an intermediary between the set top terminals 220 and the operations center 202 (or other remote site), the cable headend 208 performs two primary functions. First, the cable headend 208 acts as a distribution center, or signal processor, by relaying the program signal to the set top terminal 220 in each subscriber's home. In addition, the cable headend 208 acts as a network controller 214 by receiving information from each set top terminal 220 and passing such information on to an information gathering site such as the operations center 202.

Figure 3 shows an embodiment where the cable headend 208 and the subscriber's home are linked by certain communications media 216. In this particular embodiment, analog signals, digitally compressed signals, other digital signals and up-stream/interactivity signals are sent and received over the media 216. The cable headend 208 provides such signaling capabilities in its dual roles as a signal processor 209 and network controller 214.

As a signal processor 209, the cable headend 208 prepares the program signals that are received by the cable headend 208 for transmission to each set top terminal 220.

In the preferred system, the signal processor 209 re-routes or demultiplexes and recombines the signals and digital information received from the operations center 202 and allocates different portions of the signal to different frequency ranges. Cable headends 208 which offer different subscribers different program offerings may allocate the program signals from the operations center 202 in various manners to accommodate different viewers. The signal processor 209 may also incorporate local programming and/or local advertisements into the program signal and forward the revised signal to the set top terminals 220. To accommodate this local programming availability, the signal processor 209 must combine the local signal in digital or analog form with the operations center program signals. If the local cable system uses a compression standard that is different than the one used by the operations center 202, the signal processor 209 must also decompress and recompress incoming signals so they may be properly formatted for transmission to the set top terminals 220. This process becomes less important as standards develop (i.e., MPEG 2). In addition, the signal processor 209 performs any necessary signal decryption and/or encryption.

As a network controller 214, the cable headend 208 performs the system control functions for the system. The primary function of the network controller 214 is to manage the configuration of the set top terminals 220 and process signals received from the set top terminals 220. In the preferred embodiment, the network controller 214 monitors, among other things, automatic poll-back responses from the set top terminals 220 remotely located at each subscribers' home. The polling and automatic report-back cycle occurs frequently enough to allow the network

controller 214 to maintain accurate account and billing information as well as monitor authorized channel access. In the simplest embodiment, information to be sent to the network controller 214 will be stored in RAM within each subscriber's set top terminal 220 and will be retrieved only upon polling by the network controller 214. Retrieval may, for example, occur on a daily, weekly or monthly basis. The network controller 214 allows the system to maintain complete information on all programs watched using a particular set top terminal 220.

The network controller 214 is also able to respond to the immediate needs of a set top terminal 220 by modifying a program control information signal received from the operations center 202. Therefore, the network controller 214 enables the delivery system to adapt to the specific requirements of individual set top terminals 220 when the requirements cannot be provided to the operations center 202 in advance. In other words, the network controller 214 is able to perform "on the fly programming" changes. With this capability, the network controller 214 can handle sophisticated local programming needs such as, for example, interactive television services, split screen video, and selection of different foreign languages for the same video. In addition, the network controller 214 controls and monitors all compressors and decompressors in the system.

The delivery system 200 and digital compression of the preferred embodiment provides a one-way path from the operations center 202 to the cable headend 208. Status and billing information is sent from the set top terminal 220 to the network controller 214 at the cable headend 208 and not directly to the operations center 202. Thus, program monitoring and selection control will take place only at the

5 cable headend 208 by the local cable company and its decentralized network controllers 214 (i.e., decentralized relative to the operations center 202, which is central to the program delivery system 200). The local cable company will in turn be in communication with the operations center 202 or a regional control center (not shown) which accumulates return data from the set top terminal 220 for statistical or billing purposes. In alternative system embodiments, the operations center 202 and the statistical and billing sites are
10 collocated. Further, telephone lines with modems are used to transfer information from the set top terminal 220 to the statistical and billing sites.

5. Set Top Terminal

15 The set top terminal 220 is the portion of the delivery system 200 that resides in the home of a subscriber. The set top terminal 220 is usually located above or below the subscriber's television, but it may be placed anywhere in or near the subscriber's home as long as it is within the range of the subscriber's remote control device 900. In some aspects,
20 the set top terminal 220 may resemble converter boxes already used by many cable systems. For instance, each set top terminal 220 may include a variety of error detection, decryption, and coding techniques such as anti-taping encoding. However, it will become apparent from the
25 discussion below that the set top terminal 220 is able to perform many functions that an ordinary converter box cannot perform.

30 The set top terminal 220 has a plurality of input and output ports to enable it to communicate with other local and remote devices. The set top terminal 220 has an input port that receives information from the cable headend 208. In addition, the unit has at least two output ports which provide

communications from the set top terminal 220 to a television and a VCR. Certain menu selections may cause the set top terminal 220 to send control signals directly to the VCR to automatically program or operate the VCR. Also, the set top terminal 220 contains a phone jack which can be used for maintenance, trouble shooting, reprogramming and additional customer features. The set top terminal 220 may also contain stereo/audio output terminals and a satellite dish input port.

Functionally, the set top terminal 220 is the last component in the delivery system chain. The set top terminal 220 receives compressed program and control signals from the cable headend 208 (or, in some cases, directly from the operations center 202). After the set top terminal 220 receives the individually compressed program and control signals, the signals are demultiplexed, decompressed, converted to analog signals (if necessary) and either placed in local storage (from which the menu template may be created), executed immediately, or sent directly to the television screen.

After processing certain signals received from the cable headend 208, the set top terminal 220 is able to store menu templates for creating menus that are displayed on a subscriber's television by using an array of menu templates. Before a menu can be constructed, menu templates must be created and sent to the set top terminal 220 for storage. A microprocessor uses the control signals received from the operations center 202 or cable headend 208 to generate the menu templates for storage. Each menu template may be stored in volatile memory in the set top terminal 220. When the set top terminal receives template information it demultiplexes the program control signals received from the

5 cable headend 208 into four primary parts: video, graphics, program logic and text. Each menu template represents a different portion of a whole menu, such as a menu background, television logo, cursor highlight overlay, or other miscellaneous components needed to build a menu. The menu templates may be deleted or altered using control signals received from the operations center 202 or cable headend 208.

10 Once the menu templates have been stored in memory, the set top terminal 220 can generate the appropriate menus. In the preferred embodiment, the basic menu format information is stored in memory located within the set top terminal 220 so that the microprocessor may locally access the information from the set top terminal instead of from an incoming signal. The microprocessor next generates the appropriate menus from the menu templates and the other menu information stored in memory. The set top terminal 220 then displays specific menus on the subscriber's television screen that correspond to the inputs the subscriber selects.

20 If the subscriber selects a specific program from a menu, the set top terminal 220 determines on which channel the program is being shown, demultiplexes and extracts the single channel transmitted from the cable headend 208. The set top terminal 220 then decompresses the channel and, if necessary, converts the program signal to an analog NTSC signal to enable the subscriber to view the selected program. The set top terminal 220 can be equipped to decompress more than one program signal, but this would unnecessarily add to the cost of the unit since a subscriber will generally only view one program at a time. However, two or three decompressors may be desirable to provide picture-on-

picture capability, control signal decompression, enhanced channel switching or like features.

5 In addition to menu information, the set top terminal 220 may also store text transmitted from the cable headend 208 or the operations center 202. The text may inform the subscriber about upcoming events, billing and account status, new subscriptions, or other relevant information. The text will be stored in an appropriate memory location depending on the frequency and the duration of the use of the textual message.

10 Also, optional upgrades are available to enhance the performance of a subscriber's set top terminal 220. These upgrades may consist of a cartridge or computer card (not shown) that is inserted into an expansion slot in the set top terminal 220 or may consist of a feature offered by the cable headend 208 or operations center 202 to which the user may subscribe. Available upgrades may include on line data base services, interactive multi-media services, access to digital radio channels, and other services.

15 In the simplest embodiment, available converter boxes such as those manufactured by General Instruments or Scientific Atlanta, may be modified and upgraded to perform the functions of a set top terminal 220. The preferred upgrade is a circuit card with a microprocessor which is electronically connected to or inserted into the converter box.

20 6. Remote Control Device

25 The primary conduit for communication between the subscriber and the set top terminal 220 is through the subscriber interface, preferably a remote control device 900. Through this interface, the subscriber may select desired programming through the system's menu-driven scheme or

by directly accessing a specific channel by entering the actual channel number. Using the interface, the subscriber can navigate through a series of informative program selection menus. By using menu-driven, iconic or alpha-character access, the subscriber can access desired programs by simply pressing a single button rather than recalling from memory and pressing the actual channel number to make a selection. The subscriber can access regular broadcast and basic cable television stations by using either the numeric keys on the remote control 900 (pressing the corresponding channel number), or one of the menu icon selection options.

In addition to enabling the subscriber to easily interact with the cable system 200, the physical characteristics of the subscriber interface 900 should also add to the user friendliness of the system. The remote control 900 should easily fit in the palm of the user's hand. The buttons of the preferred remote control 900 contain pictorial symbols that are easily identifiable by the subscriber. Also, buttons that perform similar functions may be color coordinated and consist of distinguishing textures to increase the user friendliness of the system.

7. Menu-Driven Program Selection

The menu-driven scheme provides the subscriber with one-step access to all major menus, ranging from hit movies to sport specials to specialty programs. From any of the major menus, the subscriber can in turn access submenus and minor menus by cursor or alpha-character access.

There are two different types of menus utilized by the preferred embodiment, the Program Selection menus and the During Program menus. The first series of menus, Program Selection menus, consists of an Introductory, a Home, Major menus, and Submenus. The second series of

menus. During Program menus, consists of two primary types, Hidden menus and the Program Overlay menus.

5 Immediately after the subscriber turns on the set top terminal 220, the Introductory menu welcomes the subscriber to the system. The Introductory menu may display important announcements from the local cable franchise, advertisements from the cable provider, or other types of messages. In addition, the Introductory menu can inform the subscriber if the cable headend 208 has sent a personal message to the subscriber's particular set top terminal 220.

10 After the Introductory menu has been displayed the subscriber may advance to the next level of menus, namely the Home menu. In the preferred embodiment, after a certain period of time, the cable system will advance the subscriber by default to the Home menu. From the Home menu, the subscriber is able to access all of the programming options. The subscriber may either select a program directly by entering the appropriate channel number from the remote control 900, or the subscriber may sequence through incremental levels of menu options starting from the Home menu. The Home menu lists categories that correspond to the first level of menus called Major menus.

15 If the subscriber chooses to sequence through subsequent menus, the subscriber will be forwarded to the Major menu that corresponds to the chosen category from the Home menu. The Major menus further refine a subscriber's search and help guide the subscriber to the selection of his choice.

25 From the Major menus, the subscriber may access several submenus. From each submenu, the subscriber may access other submenus until the subscriber finds a desired television program. Similar to the Major menu, each

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successive level of Submenus further refines the subscriber's search. The system also enables the subscriber to skip certain menus or submenus and directly access a specific menu or television program by entering the appropriate commands on the remote control 900.

5 The During program menus (including Hidden Menus and Program Overlay Menus) are displayed by the set top terminal 220 only after the subscriber has selected a television program. In order to avoid disturbing the subscriber, the set top terminal 220 does not display the
10 Hidden Menus until the subscriber selects the appropriate option to display a Hidden Menu. The Hidden Menus contain options that are relevant to the program selected by the viewer. For example, a Hidden Menu may contain options
15 that enable a subscriber to enter an interactive mode or escape from the selected program.

Program Overlay Menus are similar to Hidden Menus because they occur during a program and are related to the program being viewed. However, the Program Overlay Menus
20 are displayed concurrently with the program selected by the subscriber. Most Program Overlay Menus are small enough on the screen to allow the subscriber to continue viewing the selected program comfortably.

B. Detailed Set Top Terminal Description

25 The set top terminal 220 receives and manipulates signals from the cable headend 208. The set top terminal 220 is equipped with local computer memory and the capability of interpreting the digitally compressed signal to produce menus for the subscriber. The remote control 900
30 communicates the subscriber's selections to the set top terminal 220. The subscriber's selections are generally based

upon menus or other prompts displayed on the television screen.

5 It is preferred that the signal reaches the subscriber's home in a compressed format and is decompressed prior to viewing. Included in the delivered program signal is information that enables equipment at the subscriber's home to display menus for choosing particular programs. Depending on the particular embodiment, the television program signal may arrive at the subscriber's home through one or more connections such as coaxial cables, fiber cables, 10 twisted pairs, cellular telephone connections, or personal communications network (PCN) hookups.

15 The program control information signal is generated by the operations center 202 and provides the network controller 214 with data on the scheduling and description of programs. In an alternate configuration, this data is sent directly to the set top terminal 220 for display to the subscriber. In the preferred embodiment, the program control information signal is stored and modified by the 20 network controller 214 and sent to the set top terminal 220 in the form of a set top terminal control information stream (STTCIS). The set top terminal 220 integrates either the program control information signal or the STTCIS with data stored in the memory of the set top terminal 220 to generate 25 on-screen menus that assist the subscriber in choosing programs for display.

30 The types of information that can be sent using the program control signal include: number of program categories, names of program categories, what channels are assigned to a specific category (such as specialty channels), names of channels, names of programs on each channel, program start times, length of programs, description of

programs, menu assignment for each program, pricing, whether there is a sample video clip for advertisement for the program, and any other program, menu or product information.

5 With a minimal amount of information being communicated to the set top terminal 220 on a regular basis, the set top terminal 220 is able to determine the proper menu location for each program and the proper time and channel to activate for the subscriber after a menu selection.
10 The program control information signal and STTCIS can be formatted in a variety of ways and the on-screen menus can be produced using many different methods. For instance, if the program control information signal carries no menu
15 format information, the menu format for creating the menus can be fixed in ROM at the set top terminal 220. In the preferred embodiment, the menu format information is stored at the set top terminal 220 in a temporary memory device such as a RAM or EPROM. New menu format
20 information is sent via the program control information signal or the STTCIS to the set top terminals 200 whenever a change to a menu format is desired.

 In the simplest embodiment, the menu formats remain fixed and only the text changes. In this way the program control information signal can be limited to primarily text
25 and a text generator can be employed in the set top terminal 220. Another simple embodiment uses a separate channel full-time (large bandwidth) just for the menu information.

 Live video signals may be used in windows of certain menus. These video signals can be transmitted using the
30 program control information signal or STTCIS, or can be taken off channels being transmitted simultaneously with the menu display. Video for menus, promos or demos may be

sent to the set top terminal 220 in several formats, including (1) on a dedicated channel, (2) on a regular program channel and scaled to size, or (3) along with the program control information signal. However, in the preferred embodiment, a large number of short promos or demo video is sent using a split screen technique on a dedicated channel. A multiple window technique may be used with the menus to display a description of a program and one or more video frames that assist the subscriber in selecting the program.

Figure 4 shows the basic hardware components of the set top terminal 220. The set top terminal 220 has a tuner 603, digital demodulator 606, decryptor 600, and demultiplexers 609, 616 as well as audio equipment 612 and a remote control interface 626 for receiving and processing signals from the remote control unit 900. An optional modem 627 allows communication between a microprocessor 602 and the cable headend 208. An NTSC encoder 625 provides a standard NTSC video output.

The microprocessor 602 is capable of executing program instructions stored in memory. These instructions allow a user to access various menus by making selections on the remote control 900.

The manner in which the video is decompressed and the menus are generated from the program control information signal or STTCIS varies depending on the specific embodiment of the invention. Video decompressors 618 and 622 may be used if the video is compressed. The program control information signal may be demultiplexed into its component parts, and a video decompressor 618, graphic decompressor, text generator and video combiner 624 may be used to assist in creating the menus.

In addition to the menu format information that is stored in graphics memory, the set top terminal 220 also stores data tracking those programs that have been selected for viewing. By gathering this data, the set top terminal 220 can maintain an accurate record of all programs accessed/watched by storing the data in EEPROM or RAM. Subsequently, this data can be transmitted to the cable headend 208, where it can be used in carrying out network control and monitoring functions. Such data transmissions between the set top terminal 220 and cable headend 208 can be accomplished, for example, through upstream transmission over the cable network or over telephone lines through the use of telephone modems. Where upstream transmission over the cable network is used, the set top terminals 220 can complete data transmissions on a scheduled (e.g., using a polling response or status report to respond to polling requests sent from the cable headend 208) or as-needed (e.g., using a random access technique) basis.

Figure 5a shows the front panel of the set top terminal 220, which includes an infrared sensor 630 and a series of LED displays 640. The LED displays 640 may indicate with an icon or a letter (e.g. A-K) the major menu currently selected by the set top terminal 220 or the channels selected directly by a user, or menu channel selections (e.g., from 1 to 50). Further displays may include current channel, time, volume level, sleep time, parental lock (security), account balance, use of a hardware upgrade, second channel being recorded by VCR, use of the Level D music hardware upgrade in a separate room, and any other displays useful to a subscriber to indicate the current status of the set top

terminal 220. The LEDs 640 may also provide an indication of the digital audio channel currently tuned.

5 The set top terminal 220 includes a flapped opening 635 on its front that allows the insertion of a magnetic cartridge (or similar portable storage device, including optical disk, ROM, EPROM, etc. not shown). This cartridge opening 635 allows the set top terminal 220 to be upgraded or reprogrammed locally with the use of a magnetic tape cartridge.

10 On the top or cover of the set top terminal 220 are located pushbutton controls 645. Any function that can be performed on the remote 900 may also be performed at the set top terminal 220 using the duplicative pushbutton controls 645.

15 Figure 5b shows the back of the set top terminal 220, which includes a pair of output terminals 650, pair of input terminals 652, pair of stereo/audio output terminals 654, satellite dish input port 656, telephone jack 658 and an RS-422 port 660. In addition, an upgrade port 662 and a cover plate 664 are held in place by a series of sheet metal screws. One of the output terminals 650 is for a television and the other is for a VCR. The set top terminal 220 is equipped to handle incoming signals on one or two cables using the input terminals 652. The phone jack 658 and an RS-232 or RS-422 port 660 are provided for maintenance, trouble shooting, reprogramming and additional customer features. In alternate embodiments, the telephone jack 658 may be used as the primary mode of communication between the cable headend 208 and the set top terminal 220. This connection is possible through the local telephone, cellular telephone or a personal communications network (PCN).

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The basic programming of each set top terminal 220 is located on ROM within the set top terminal 220. Random access memory, the magnetic cartridge capability, and the expansion card slot 635 each allow upgrades and changes to be easily made to the set top terminal 220.

In the preferred embodiment, the set top terminal 220 includes a hardware upgrade port 662, in addition to expansion card slots. The hardware upgrade port 662 accommodates a four-wire (or more) connection for: (1) error corrected, decrypted data output of the set top terminal 220, (2) a control interface, (3) decompressed video output, and (4) a video input port. In the preferred embodiment, multiple wires are used to perform each of the four functions. The four sets of wires are combined in a single cable with a single multipin connector.

In the preferred embodiment, multipin connections may be used for the multiwire cable. The multipin connection 662 may range from DB9 to DB25. A variety of small computer systems interface (SCSI) ports may also be provided. Alternatively, four or more ports may be provided instead of the single port depicted.

Another port 662 is used to attach the various hardware upgrades described below to a set top terminal 220. The preferred embodiment has a number of hardware upgrades available for use with a set top terminal 220, including: (1) a Level A interactive unit, (2) a Level B interactive unit, (3) a Level C interactive unit with compact disc capability, (4) a Level D digital radio tuner for separate room use, and (5) a Level E information download unit. Each of these upgrades may be connected to the set top terminal 220 unit through the upgrade port 662 described earlier. The same four wires in a single cable described earlier may be used.

Existing set top converter boxes such as those made by Scientific Atlanta or General Instruments are presently unequipped to handle the menu selection system of the present invention. Thus, hardware modifications are
5 necessary in order to use the menu selection system with existing set top converter technology.

A Turbo Card addition to a set top converter is depicted in Figure 6. The Turbo Card 700 shown provides the additional functionality needed to utilize the menu system
10 with existing set top converter technology. The primary functions the Turbo Card 700 adds to the set top converter are the interpreting of program control information signals, generating of menus, sequencing of menus, and, ultimately, the ability of the viewer to select a channel through the menu
15 system without entering any channel identifying information. The turbo card also provides a method for a remote location, such as the cable headend 208, to receive information on programs watched and control the operation of the set top converter and Turbo Card 700. The programs watched
20 information and control commands may be passed from the cable headend 208 to the Turbo Card 700 using telephone lines.

The primary components of the Turbo Card 700 are a PC chip CPU 702, a VGA graphic controller 704, a video
25 combiner 706, logic circuitry 708, NTSC encoder 710, a receiver 712, demodulator 714, and a dialer 716. The Turbo Card 700 operates by receiving the program control information signal from the cable headend 208 through the coaxial cable. The logic circuitry 708 of the Turbo Card 700
30 receives data, infrared commands, and synchronization signals from the set top converter. Menu selections made by the viewer on the remote control 900 are received by the set

The name entry window 1160 is limited to six letters in the preferred embodiment with the cursor on the first location, and a name is entered sequentially one letter at a time. The channel up/down key, either on the remote or set top terminal 220, allows the viewer to scroll forward and backward, respectively, through the alphabet. When the desired letter has been chosen and entered, the viewer can use the volume up/down key to move left and right in the name through all the letter positions, until the actor's name has been fully or partially entered. The search tool will search for all the occurrences of the letters entered. If the name has been fully entered, a precise search of the program abstract database will be conducted for that name. If the name has been only partially entered, the search tool will look for a closest match to the partially entered name.

The TIME criteria 1162 allows a viewer to choose the preferred time of day, the preferred duration (in 30 minute increments up to 2 hours), and the preferred day of the week. An alternative embodiment would allow the viewer to select up to X hour time periods for a certain day in which to search.

The YEAR criteria 1164 preferably comprises groupings of years. For example, the current year and programs five to ten years old, ten to 20 years old, 20 to 40 years old, and older than 40 years. If desired, the viewer can highlight more than one group of years. If the viewer does not highlight any grouping of years, then all years are assumed desired by the viewer.

The STANDARD RATING criteria 1166 allows the viewer to qualify the search to one or more of the MPAA ratings (G, PG, PG-13, R, NC-17).

In alternative embodiments, the actors, time, years, ratings, etc., can also be selected through the provision of submenus similar to those depicted in Figures 11b-11d.

5 The preferred embodiment also provides for "negative" searches. In this type of search, words descriptive of a program type of no interest to the viewer can either be used directly as key words or mapped into key words in the downloaded thesaurus. If the key words are found in a program during a search of the database, the program is
10 automatically excluded from the selection list. For example, if the viewer does not desire to view any X or R rated movies, the viewer can simply choose to exclude movies rated as X or R by selecting these ratings on the main menu.

15 In this embodiment, after the viewer has selected as many of the entries as desired, and then hits the "go" button or alternatively selects by cursor or highlight a "go" menu item on the menu screen, the corresponding search will commence. Any typical search tool can be used to search the program abstract database. For example, a Boolean search
20 can be used to scan the database of textual entries and retrieve the textual entries that satisfy the Boolean search. The programs which meet the search criteria (contain the key words corresponding to entries) selected by the viewer will be counted and the count displayed in the "No. Selections" box 1170 in the upper right hand corner of each
25 of the screens 1130, 1136, 1146, 1154 of Figure 11a through 11d.

30 If the viewer desires to view a list of all of these selections and/or corresponding abstracts, the viewer may select the VIEW option 1172 in the main menu 1130. Upon selection of the view option, the microprocessor 602 instructs the selection list menu 1174, as shown in Figure

11e, to be displayed on the screen. The viewer can scroll down the list by using the cursor and select the desired movie by clicking on the desired program indicated by cursor or highlight. In Figure 11e, for example, the viewer has selected the John Wayne movie GREEN BERETS. After making the selection, the program is displayed on the screen, but if there are too many or too few programs listed, or the viewer decides not to watch any of the selected programs, the viewer has the option of returning to the main menu by selecting the RETURN TO MAIN MENU box 1176. Once the main menu screen 1130 is displayed, the viewer may choose to begin a completely new search, or alternatively, may refine the prior search. If the viewer chooses to perform a refined search, the viewer can access the various submenus and choose further preference entries resulting in a more precise search and fewer number of program selections.

It is understood that this embodiment of searching program abstract databases can be combined with the other methods described below, including viewer profile data and most often watched information. For example, different criteria can be assigned different weights (weighting the criteria's preference entries). Then based on an evaluation of the weighted preference entries, only those programs satisfying a minimum weighted index would show up as a selection to be suggested to the viewer.

Alternatively, program indicators can be generated and used in assigning a weight number to programs. The weight a program is assigned could be based on either most watched program information, favorite channel, or personal profile as described below. The list of suggested entries resulting from the program abstract search methodology described above

could then be further refined and reduced based on the results of accumulating the weighted indicators corresponding to the programs listed. For example, weighted numbers can be assigned to programs based primarily on the category of the program. The weighted numbers are used by the system to refine the search. Those programs suggested from the program abstract search can then be prioritized and either displayed in prioritized order or further refined by deleting programs not satisfying a minimum weight threshold thereby reducing the list of suggested programs displayed to the viewer. The refined list is then displayed to the viewer.

c. Other Program Suggestion Embodiments

In another "Responsive" embodiment, a favorite channel list can be established based on responses to inquiries. In this embodiment, menus can be used to query a subscriber and allow the subscriber to select eight favorite channels for later display. Figure 12a depicts a menu 1180, the Broadcast TV Menu, with a favorite channels category of program menus 1182 for selection. Figure 12b shows an example of a favorite channel program submenu 1184 being displayed. Although a variety of types of information can be requested, mood questions and inquiries on personal information about a subscriber are preferred for this responsive method of selecting programs for viewers.

In another embodiment, both favorite channels and often watched channels features can be utilized during menu selection. As described above, favorite channels can be stored in memory in the set top terminal 220 for later use. In addition to favorite channels, the broadcast TV menu 1180, has a separate often watched channels category 1186 which

allows the subscriber or the set top terminal 220 in a learning mode to choose eight additional channels for display.

5 In another embodiment, in a manner similar to learning the most often watched channels of the subscriber, the terminal can also determine the most often watched programs by the subscriber. After developing (or learning) a
10 list of popular shows or querying the subscriber for a list of popular shows the terminal can display a customized submenu allowing the subscriber to choose one of the suggested popular shows available for viewing. In order to display suggested programs that are available, the set top terminal 220 must cross reference the available programs with the viewers choices. This can be accomplished using
15 the program control information signal. After the cross reference, a popular show submenu similar to the favorite channel submenu shown in Figure 12b may be displayed on the television or monitor.

In one embodiment, a sophisticated program viewing suggestion feature is available as an optional feature for the
20 subscriber. This feature gives the indecisive viewer or lazy viewer specific suggestions as to which programs the viewer should watch. The set top terminal 220 uses a combination of intelligent and responsive methodologies along with a matching algorithm to accomplish the program viewing
25 suggestion feature.

In order for the set top terminal 220 to make decisions on which programs the subscriber should watch, the terminal creates a personal profile for the particular viewer. Using the data in the particular viewer's personal profile, subscriber
30 mood information and the television program information available in the program control information signal, the set

top terminal 220 is able to select a group of programs which the particular viewer is most likely to watch.

Specifically, the set top terminal 220 builds a personal profile for each viewer and stores the information in a memory file by viewer name. To build a personal profile, the viewer answers a series of questions presented on a series of menu screens. These personal profile screens request the viewer to input information such as name, sex, age, place of birth, place of lower school education, employment type, level of education, amount of television program viewing per week, and the number of shows in particular categories that the viewer watches in a given week such as, sports, movies, documentaries, sitcoms, etc. A universal remote control 900 with alpha-numeric buttons may be used to assist in entering the demographic data. Any subscriber demographic information which will assist the set top terminal 220 in suggesting television programs to the viewer may be used. This raw data must be interpreted, formatted, and stored in memory by the set top terminal 220. Preferably the gathered data is processed and stored in a relational database. Once a personal profile has been created (in a particular set top terminal 220), it can be indefinitely stored in nonvolatile memory.

Alternatively, the personal profile information may be electronically transmitted to the set top terminal 220 from a remote location such as the cable headend 208 or billing site. In some cable systems, personal profile information is stored at the billing site. This information can be electronically transmitted via phone or cable to the set top terminal 220. The set top terminal 220 must receive the data, interpret the data, and format the data for storage in a database in memory, as well as for later use.

A selection at the home menu screen 1010 (Figure 8) activates the program selection feature. Following activation of the program selection feature, as shown in Figures 12c-12e, the set top terminal 220 will present the viewer with a series of brief questions to determine the viewer's mood at that particular time. For example, the first mood question screen 1190 may ask the viewer to select whether a short (30 minute), medium (30-60 minute), or long (60 plus minute) program selection is desired, as shown in Figure 12c. The second mood question screen 1192 requests the viewer to select between a serious program, a thoughtful program, or a light program, as shown in Figure 12d. And the third mood question screen 1194 requests whether the user desires a passive program or an active program, as shown in Figure 12e. The viewer makes a selection in each question menu utilizing the cursor movement keys and "go" button on his remote control 900. A variety of other mood questions are possible such as the fatigue level of the viewer, whether the viewer is in the mood for older programming, etc.

After the viewer has responded to the mood question menus which determine the viewer's mood, the set top terminal 220 uses a matching algorithm to find the best programming matches for the viewer and displays an offering of several suggested programs to the viewer (three or more programs are preferred). The matching algorithm compares the viewer profile data, mood data, and most often watched program information (if available, or favorite program information) with information about the program derived from the program control information (or STTCIS) signal, such as show category, description type, length, etc. Using the personal profile information and mood questions suggested above, the following types of outcomes are possible.

5 If the set top terminal 220 is presented with a young female viewer, educated in Boston who watches sitcoms on a regular basis, and desires a short, light, passive program, a match might be found with the 30-minute sitcom Cheers, the
10 sitcom Designing Women, or Murphy Brown. Taking another example, for a middle-aged male viewer from the Boston area, wishing a longer length, light, passive program, the New England Patriots Football™ game, the Boston Red Sox Baseball™ game or a science fiction movie might be suggested.

15 With this program selection feature, the set top terminal 220 can intelligently assist the specific viewer in selecting a television program from among hundreds of available choices. The viewer is preferably offered a graphic menu of suggested program choices from which to choose.

20 Instead of the set top terminal 220 requiring an input of personal profile information, the terminal may also "learn" the personal profile information. A subscriber's viewing habits may be "learned" by maintaining historical data on the subscriber and analyzing this data. The historical data may include the channels (or networks) and types of programs the viewer has most frequently watched, time of viewing, duration of viewing, duration of programs viewed etc. This information must then be analyzed to profile the viewer.

25 In the preferred "learning" embodiment, the personal profile information is time and date sensitive in that program indicators will be different depending on the date and time of day. For example, a working male with a high school education who has been active in sports or enjoys sporting
30 events might have a heavily weighted sport program indicator during the day on the weekend days but a heavy comedy program indicator in the late evenings on weekdays. His

profile might show light programming on working day evenings. After analysis, the indicators can be communicated to the weighing algorithm and the matching algorithm which selects the suggested television programs. The matching
5 algorithm may be implemented through the use of a logic network. The logic network includes a signal detector which could be used for storing and accumulating the weighted indicators. Based on the accumulated weighted indicators, the logic network could provide a selection signal for use in
10 matching to a suggested program.

Examining Figure 13a, two gathering steps are required, personal information and mood information gathering, denoted at blocks 1202, 1206, respectively. As described above, there are several methods in which this
15 information may be gathered. Once it is gathered, it may be stored (and updated as necessary) for future use. The indicators may be newly calculated for each subscriber entry into the program selection system. Alternatively, at least each time the information gathered is changed or updated,
20 the information must be reinterpreted and converted into preferred program indicators, blocks 1212, 1214.

Program indicators should at a minimum indicate the type of programming to be suggested. To accomplish this, television programs are divided into program categories
25 preferably the same or similar to those categories used for the menu sequence for menu selection of programs (described in the detailed description of the set top terminal 220). For example, sports, comedy, news, documentaries, and hit movies may be program categories. Although a variety
30 of program indicators can be used, the preferred method is to assign a weight to each program category. Thus, a database of information can be analyzed and weights can be assigned to

the program categories such as sports (40), comedy (30), news (20), documentaries (5), hit movies (5).

5 Using the example shown in Figure 13a, a set of preferred program indicators consisting of categories and weights are assigned based on the personal profile data. A second set of preferred program indicators are assigned based upon the mood data. These two sets of preferred program indicators would then be analyzed and weighted, block 1218, prior to entering the matching algorithm, block 1222.

10 In a specific example, a subscribers updated personal profile might indicate: sports (40), comedy (30), news (20), documentaries (5), hit movies (5); The subscribers mood might indicate: sports (40), comedy (20), news (5), documentaries (5), hit movies (30). The weight given to mood might be a factor of three while the weight given to personal profile might be a factor of one, since mood information is the more recent and important information. The weighted indicators passed onto the matching algorithm would be three times the mood indicators plus one times the personal profile indicators, namely: sports (160), comedy (90), news (35), documentaries (20), hit movies (95). Therefore, the matching algorithm will focus on sports but also provide selections in hit movies and comedy. The matching algorithm is unlikely to suggest any programs in the news or documentaries categories.

25 The more areas of information that are gathered and used for indicators, the more weighing factors and calculations that are necessary by the weighing algorithm. Other more sophisticated methods of weighing the importance of the data may be used.

The matching algorithm receives program control signal information, block 1226, and extracts needed information therefrom, block 1230, then matches programs with subscribers. The matching algorithm involves three primary steps: (1) eliminating programs that are out of the subscribers desired time frame, (2) eliminating programs in program categories that the subscriber is not interested in watching, and (3) determining priority of desired programs. Finally, the selected programs are displayed, block 1234.

The first two steps eliminate the programs in which the viewer has shown no interest. The first step eliminates programs out of time sequence (current start time or next half hour) and outside the desired length (e.g. 30-60 minutes). With two or three hundred channels in the program delivery system this would reduce the program choices by approximately two thirds to roughly 100 programs.

The next step eliminates programs in program categories that have received the lower program indicator numbers. For instance, in the example above the news and documentaries program category received low indicator numbers. Programs in these categories are eliminated. This generally reduces the number of programs by at least 40 percent from about 100 to 60 or so programs.

The next step is to assign weight numbers to each program. Weight numbers are assigned to programs based primarily on the category of the program. If programs are in two program categories (e.g. hit movie and comedy) an average is taken of the two assigned weight numbers for each program category. The weighted numbers are used by the system as the subscribers selection criteria.

Having weighted the programs, the number of relevant programs can be reduced by examination of the weighted

numbers. It is preferred that ultimately the hundreds of available television programs be reduced to the twenty or so programs most likely to be viewed by the subscriber.

5 A variety of methods can be used to determine the final priority of the programs. Where using certain selection methodologies, programs in the same category have the same weight, other finer methods of differentiation may be used. For example, programs receiving the same weight can be further distinguished by network. Programs on the major
10 networks may take priority over programs on smaller networks. Programs that are on networks that the viewer watches more frequently can be given priority over networks less frequently watched. Another example of differentiation is that newer programs (more recently filmed programs) are
15 given priority over older programs. Finer methods of gradation may be accomplished by refining the weighted numbers assigned to the programs or through simple reprioritizing of programs on the short list of twenty programs.

20 Following the matching, the programs may be displayed on a menu screen generated as described earlier. A signal identifying the suggested programs is generated to assist in the menu generation process. It is preferred that 4 to 8 selections are shown on a menu screen. If none of these
25 selections are satisfactory to the viewer, then a second and third menu screen of program choices may be displayed. Upon selection of a program the set top terminal tunes or switches the viewer to the chosen program.

30 In an alternative embodiment, as shown in Figure 13b (commonly numbered with Figure 13a except for block 1238), program watched information, block 1238, can be used directly in the matching algorithm. One way in which

the program watched information can be used directly by the matching algorithm is by determining and using the often watched information in the final decision step. After the matching algorithm has ordered a selection of programs for the viewer the often watched program list may be used to modify or refine the final program list prior to display. For example, the matching algorithm may choose 20 of 100 programs and order the programs 1 through 20 from the most likely to the least likely viewer choices. This ordered list of 20 is compared with the most often watched program list.

A simple use of the list would be to compare between the ordered list of 20 selected programs and the often watched list, to locate the matches or closely related programs and increase the order number of those programs or "bump up" those programs on the ordered list. A second method would be to increase the located programs weighted number before ordering the 20 programs according to weight. In either case, the effect is that the often watched programs are shifted to a higher priority on the list of twenty programs and ultimately may be placed on the first suggested menu screen of programs. A third method of using the information would be to locate any often watched program existing within the 100 current programs and assign each located program a high weighted value before the matching algorithm calculations described above are performed.

In an alternative embodiment, additional coded information is provided to the set top terminal 220 via the program control information signal to assist with the program selection. For example, demographic codes for each program may be sent via the program control information signal. Additional bits could be added to the frame shown in Figure

7a to facilitate the communications of the code from the controller to the set top terminal 220. A code table could be stored in memory at the network controller 214. Each code would correspond to an attribute. In this embodiment, a
5 program database would comprise a listing of hundreds of programs along with codes which provide descriptive attributes pertaining to the program. These attributes could be similar to the entries already described above in the menus of figures 11a-11e. The demographic codes describe
10 the subscriber demographics most likely to match with the program. Thus, a comparison of the stored demographics in the personal profile and the demographic codes will render a list of preferred programs for the subscriber. Those skilled in the art will realize that a variety of information may be sent
15 by code via the program control information signal.

Although the embodiments specifically describe the use of several sources of information to suggest programs to the subscriber (i.e. mood and personal profile), those skilled in the art will realize that any one source of information or many
20 more sources may be used. Those skilled in the art will also realize that this program suggestion methodology is not limited to the specifics types of information described but can be used with various types of information that indicate a viewer preference.

25 Using these methodology, it is even possible for the set top terminal 220 to suggest programs for two viewers. By using two sets of viewer profile information, the matching algorithm can find the best match for joint viewing. For example, the set top terminal 220 can suggest programs for a
30 couple watching television simultaneously. The terminal would use the data stored in memory for each of the two viewers and determine the couples program selections which

are similar or overlap. This method of program selection can resolve disputes between viewers.

After a subscriber selects a suggested program from a menu screen or list of the selection feature, the
5 microprocessor 602 electronically informs the tuning and decompressing hardware of the bandwidth location of the appropriate program (within the television program signal). Armed with this information the set top terminal 220 is able to display the program for the viewer on a television, monitor
10 or similar device. Alternatively, a preview menu screen 1142 as shown in Figure 14 may be shown to the subscriber which describes and previews the program selection. The preview menu screens may include live video or stills 1144 depicting the program selected.

15 The terms and descriptions used herein are set forth by way of illustration only and are not meant as limitations. Those skilled in the art will recognize that numerous variations are possible within the spirit and scope of the invention as defined in the following claims.

20 What is claimed is:

CLAIMS

What is claimed is:

1. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule and description data, and subscriber specific data indicative of a subscribers programming preferences, the set top terminal comprising:
 - a means for gathering subscriber specific data indicative of subscriber preferences to be used in selecting programs;
 - a means, connected to the gathering means, for storing subscriber specific data;
 - means for receiving program control information to be used in selecting programs;
 - program selection means, operably connected to the storing means and the receiving means, for selecting one or more programs using the subscriber specific data and program control information whereby the selected programs correspond to subscriber preferences; and
 - means, operably connected to the program selection means, for displaying the selected programs to the subscriber.
2. The set top terminal of claim 1 wherein the means for gathering subscriber specific data further comprises a means for receiving the subscriber specific data indicative of subscriber preferences from a remote location.
3. The set top terminal of claim 1 wherein the set top terminal receives menu details from the program television

delivery system and wherein the means for gathering subscriber specific data further comprises:

a memory means for storing received menu details;

5 a means for generating menu screens by integrating the program control information with the menu details;

a means for displaying menu screens to elicit subscriber responses; and

10 a subscriber interface means for entry of subscriber responses to menu screens.

4. The set top terminal of claim 1 wherein the program selection means further comprises:

15 a means for matching the subscriber specific data to a program described by the program control information; and

wherein the set top terminal further comprises a means for tuning to the program.

20

5. The set top terminal of claim 1 wherein the set top terminal receives program signals, the set top terminal further comprises means for generating a signal identifying a selected program's location on the received program signal.

25

6. The set top terminal of claim 3 wherein the menu details include a cursor overlay and the means for generating menu screens comprises a means for generating cursor overlays, and wherein the subscriber interface means for entry of subscriber responses comprises a means for cursor movement for moving the cursor overlay on menus.

30

7. A method used by a set top terminal for a television program delivery system for suggesting programs to subscribers for display on a television using program control information containing a program schedule and description data, and subscriber specific data indicative of a subscribers programming preferences, the method comprising:

gathering subscriber specific data indicative of subscriber preferences to be used in selecting programs;

storing subscriber specific data;

receiving a program control information signal to be used in selecting programs;

selecting one or more programs using the subscriber specific data and program control information wherein the selected programs correspond to subscriber preferences; and

displaying the selected programs to the subscriber.

8. The method of claim 7 wherein the set top terminal generates menus based on menu details received over the program television delivery system further comprising the following steps;

storing menu details;

generating menu screens using the stored menu details by integrating the program control information with the menu details;

displaying menu screens whereby the menu screens identify the selected programs; and

receiving subscriber responses to the menu screens.

9. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing menu screen details, a program schedule and description data, and subscribers programming preferences, by searching television program abstracts stored in a database for programs which correlate to key words mapped from one or more specific entries, wherein the specific entries are determined by subscriber responses to search criteria containing a plurality of selectable entries on one or more menu screens displayed on a television, comprising:

a means for receiving a program control information;

a means for storing the program abstracts in a database;

a memory means for storing menu screen details;

means for generating menu screens using menu details, whereby the menu screens are generated by integrating program control information with the menu details, and whereby the menus list search criteria containing the plurality of selectable entries;

a means for displaying the menu screens;

a subscriber interface means for entry of subscriber responses to the plurality of selectable entries on the menu screens resulting in specific entries;

a means, connected to the receiving means, for mapping the specific entries into the key words;

a means for searching the program abstract database for programs consisting of one or more of the key words;

a program selection means, operably connected to the receiving means and searching means, for

selecting one or more programs, whereby programs are selected based on the results of the searching means; and

5 means, connected to the program selection means, for displaying the selected programs.

10 10. The set top terminal of claim 9 wherein the set top terminal further comprises a means of reprogramming the program abstracts whereby changed program abstracts are received in a program control information signal.

15 11. The set top terminal of claim 9 wherein the subscriber interface means further comprises a means for interpreting the specific entries and a means for storing the specific entries.

20 12. The set top terminal of claim 9 wherein the means for generating menus further comprises a means for creating submenus whereby subscriber selectable entries are listed in the submenu and each submenu corresponds to a search criteria in a main menu.

25 13. The set top terminal of claim 9 wherein the program selection means further comprises:

means for generating preferred program indicators from a remote location;

means for assigning a weight number to programs using the preferred program indicators; and

30 means for refining the list of selected programs by selecting one or more of the programs resulting

from the program abstract search that satisfy a minimum weight criterium.

5 14. The set top terminal of claim 13 wherein the means for refining the list of selected programs further comprises a means for prioritizing the programs.

10 15. The set top terminal of claim 9 wherein the menu details include a cursor overlay and the means for generating menu screens comprises a means for generating cursor overlays, and wherein the subscriber interface means for entry of subscriber responses comprises a means for cursor movement for moving the cursor overlay on menus.

15 16. A method used by a set top terminal for a television program delivery system for suggesting programming to subscribers using program control information containing menu screen details, a program schedule and description data, and subscribers programming preferences by searching
20 television program abstracts stored in a database for programs which correlate to key words mapped from one or more specific entries, wherein the specific entries are determined by subscriber responses to search criteria containing a plurality of selectable entries on one or more
25 menu screens displayed on a television, comprising the steps of:

receiving program control information;

storing the program abstracts in a database;

storing menu screen details;

30 generating menu screens using menu details, whereby the menu screens are generated by integrating program control information with the menu details,

and whereby the menus list search criteria containing the plurality of selectable entries;

displaying the menu screens;

5 gathering subscriber responses to the plurality of selectable entries on the menu screens resulting in specific entries;

mapping the specific entries into the key words;

searching the program abstract database for programs consisting of one or more of the key words;

10 selecting one or more programs, whereby programs are selected based on the results of the searching means; and

displaying the selected programs.

15 17. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing mood menu details, a program schedule and description data, and subscriber specific data indicative of a subscribers
20 programming preference determined from subscriber responses to a set of mood questions presented on mood menu screens, the set top terminal comprising:

a means for receiving program control information to be used in selecting programs;

25 a means for obtaining television programming;

a memory means for storing mood menu details;

a means for generating mood menu screens by integrating the program control information with the mood menu details;

30 a means for displaying mood menu screens;

a subscriber interface means for entry of subscriber responses to mood menu screens;

5 a program selection means, operably connected to the memory means and the receiving means, for selecting one or more programs using the subscriber specific data and the program control information whereby the selected programs correspond to subscriber preferences; and

a means, operably connected to the program selection means, for displaying the selected programs to the subscriber.

10 18. The set top terminal of claim 17 wherein the program selection means comprises:

means for generating preferred program indicators from a remote location; and

15 means for assigning a weight number to programs using the preferred program indicators.

20 19. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule, description data, demographic codes created at a remote location and assigned to each television program, and demographic data created at a remote location describing subscribers using the set top terminal, comprising:

25 a means for receiving program control information;

a memory means for storing demographic data;

30 a program selection means, operably connected to the memory means and the receiving means, for selecting one or more programs using the program control information containing the demographic data and demographic codes;

a means, operably connected to the program selection means, for displaying the selected program.

5 20. A set top terminal used by subscribers of a television program delivery system for suggesting programs using program control information containing a program schedule and description data, and program watched data indicative of a subscribers most watched programs, the set top terminal comprising:

10 a means for receiving program control information;

a means for gathering program watched data;

a memory means for storing program watched data;

15 a program selection means, operably connected to the memory means and the receiving means, for selecting a program using the program watched data and the program control information;

20 a means, operably connected to the program selection means, for displaying the selected program.

21. A set top terminal used by subscribers of a television program delivery system for suggesting programs to subscribers using program control information containing a program schedule and description data, and channel watched data indicative of a subscribers favorite channels, the set top terminal comprising:

25 a means for gathering channel watched data;
a means for receiving program control information;

30 a memory means for storing channel watched data;

a processing means, operably connected to the memory means and the receiving means, for determining suggested favorite channels, comprising:

5 a channel selection means for selecting a plurality of channels using the channel watched data; and

means to generate a signal identifying the selected channels; and

a means, operably connected to the processing means, for displaying the list of selected channels.

10

22. A system for delivering menu selectable programs to a subscriber in a digital format and for suggesting certain of those delivered programs for viewing by the subscriber, using program control information containing a program schedule, menu details and description data, wherein the programs are
15 combined and compressed with the program control information, comprising:

a means for converting programs to digital format;

20 a means for generating program control information;

means for packaging the digital format programs using the program control information;

25 means for combining and compressing the packaged programs and program control information into a combined signal;

means for transmitting the combined signal;

a set top terminal associated with the television comprising:

30 a means for receiving the combined signal;

a means for creating personal profile information;

a means for storing personal profile information;

5 a means for generating menus from using the program control information and menu details;

a means for gathering viewer mood information using menus;

10 a means for selecting at least one program for suggestion to the viewer, comprising:

a means for integrating personal profile information and viewer mood information into selection criteria;

15 a means for comparing the selection criteria and the program control information; and

a means for matching the selection criteria with one or more programs described by the program control information; and

20 a means for displaying the suggested program to the viewer.

23. A reprogrammable set top terminal for a television delivery system capable of being remotely reprogrammed wherein information has been previously stored and such previously stored information may be upgraded using updated changes contained in a reprogramming signal, the reprogrammable set top terminal comprising:

25 a means for receiving the reprogramming signal from a remote location whereby the reprogramming signal including a command informing the set top

30

terminal that reprogramming is to commence followed by updated changes;

a means for interpreting the updated changes from the reprogramming signal;

5 a first means for storing the interpreted changes;

a second means for storing previous information;

10 a means, operably connected to the receiving means and first and second storing means, for processing the reprogramming signal whereby the processing means instructs the transfer of the interpreted changes from the first storing means to the second storing means, commands the rewriting of a the previous information in the second storing means with the interpreted changes, and instructs the set top terminal to reset so that the set top terminal
15 operates using the interpreted changes.

24. The reprogrammable set top terminal in claim 23 wherein the first means for storing comprises random access memory and wherein the second means for storing
20 comprises FLASH read/write memory.

25. The reprogrammable set top terminal in claim 23 wherein the processing means comprises reprogramming software, whereby the reprogramming software directs the reprogramming of the set top terminal.
25

26. The reprogrammable set top terminal in claim 25 wherein the processing means further comprises erasable programmable read only memory, whereby the reprogramming software is stored in the erasable programmable read only memory so that the software will continue to execute after a system failure.
30

27. The reprogrammable set top terminal in claim 25 wherein the processing means further comprises FLASH read/write memory, whereby the reprogramming software is stored in the FLASH read/write memory.

28. The reprogrammable set top terminal in claim 23 further comprising a third means for storing an operational program, whereby the set top terminal can continue to function as normal through the use of the operational program during the entire reprogramming process.

29. The reprogrammable set top terminal in claim 26 wherein the third storage means comprises a FLASH read/write memory.

30. The reprogrammable set top terminal in claim 23 wherein the means for receiving a reprogramming signal further comprises means for receiving graphics instructions and wherein the updated changes are graphics instructions.

31. The reprogrammable set top terminal in claim 23 wherein the means for receiving a reprogramming signal further comprises means for receiving graphics data and wherein the updated changes are graphics data.

32. A method for updating a reprogrammable set top terminal having volatile and nonvolatile memory containing memory locations for a television delivery system capable of being remotely reprogrammed from a remote location so that additional features may be added or existing features

upgraded with a reprogramming signal comprising the following steps:

5 receiving a command from a remote location whereby the interrupt command informs the set top terminal that reprogramming is to commence;

receiving a reprogramming signal, in frames having a control portion and a data portion, the signal designates the memory locations to be updated in a control portion of the signal frame and provides the program changes in the data portion of the signal frame;

10

reading the program changes from the reprogramming signal;

storing the program changes in volatile memory;

15 instructing the transfer of the program changes from the volatile memory to specified memory locations in nonvolatile memory, whereby the new program changes overwrite an old program in nonvolatile memory; and

resetting the set top terminal to so that the set top terminal operates using the program changes.

20

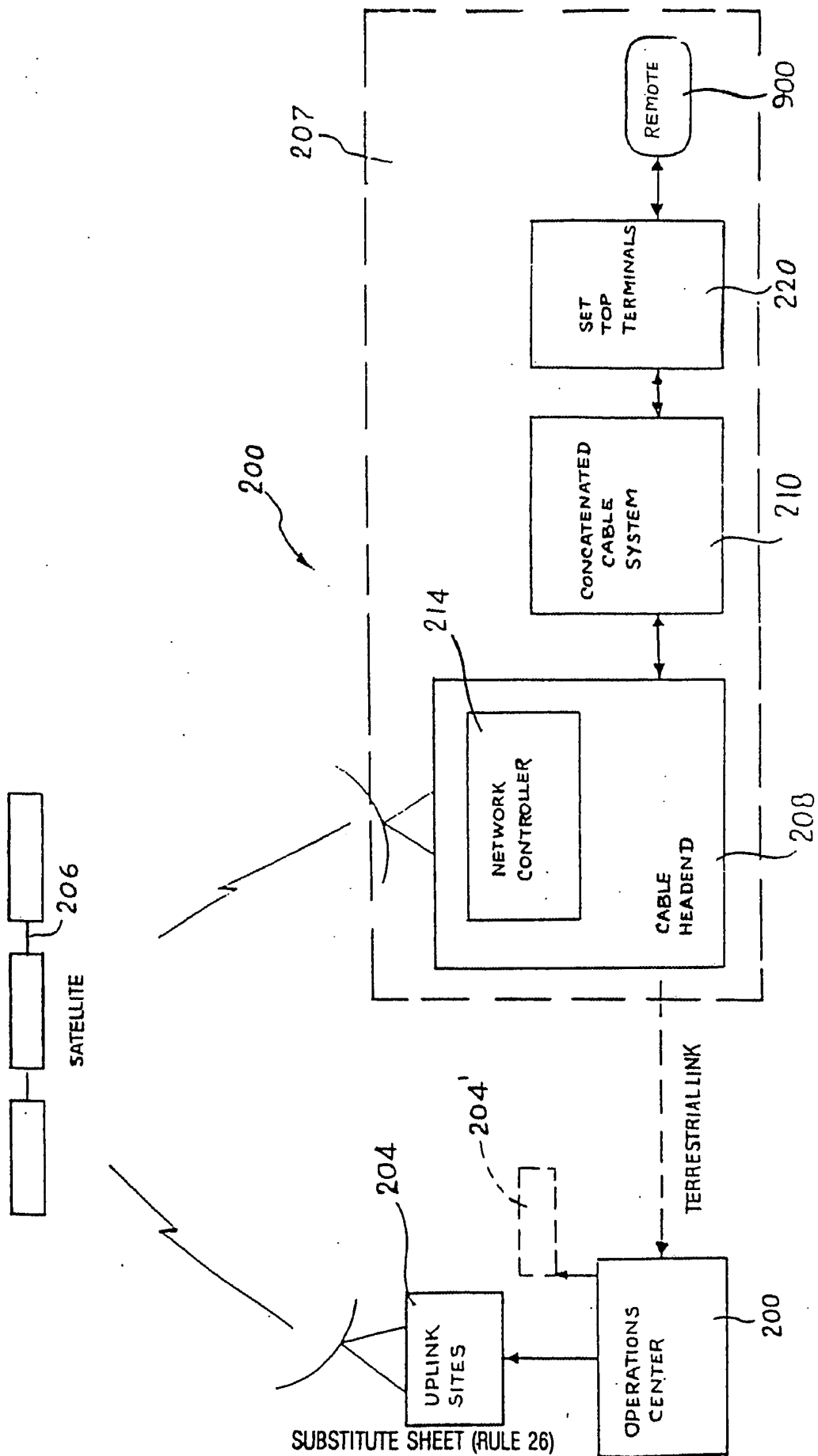


Fig. 1

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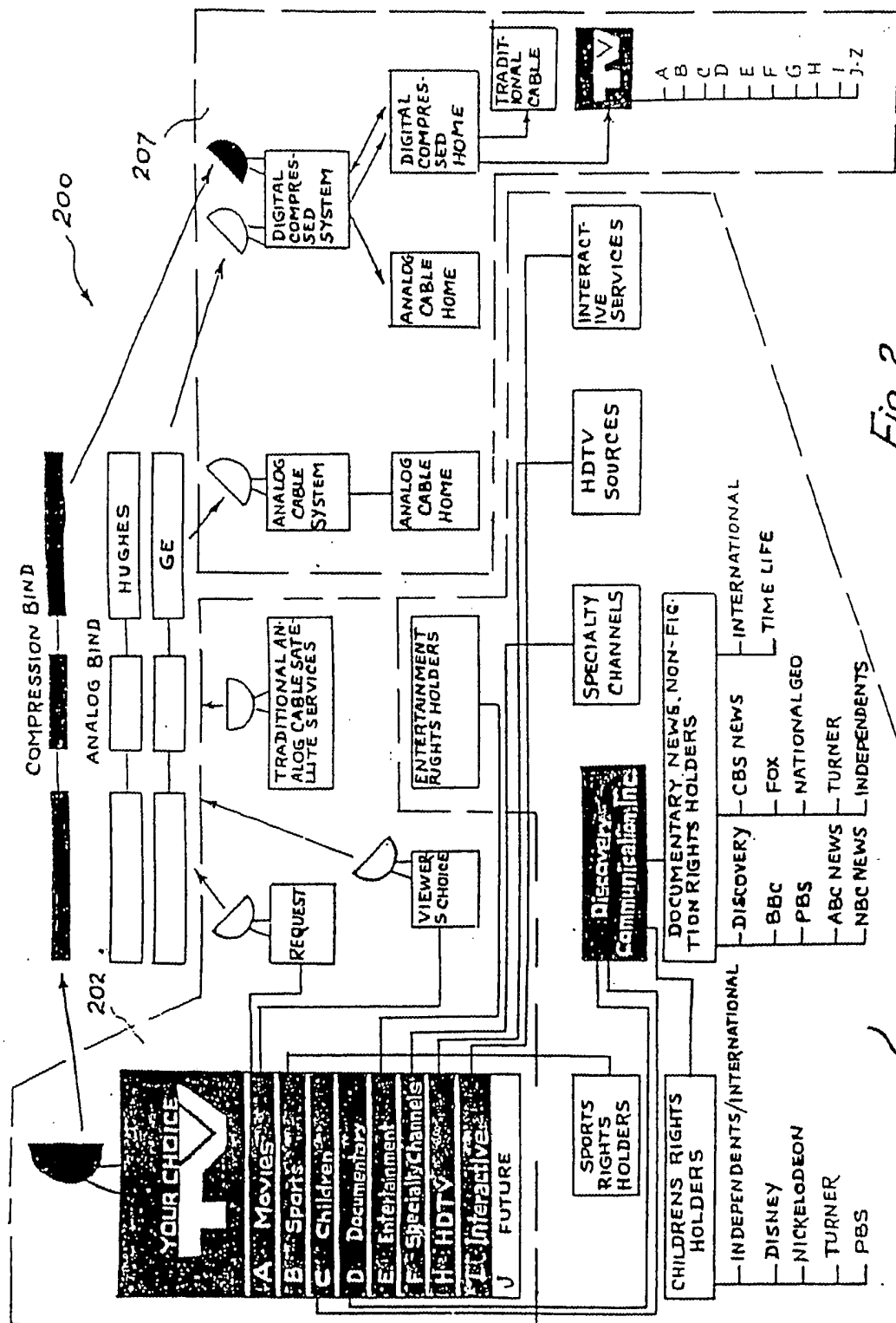


Fig. 2

212

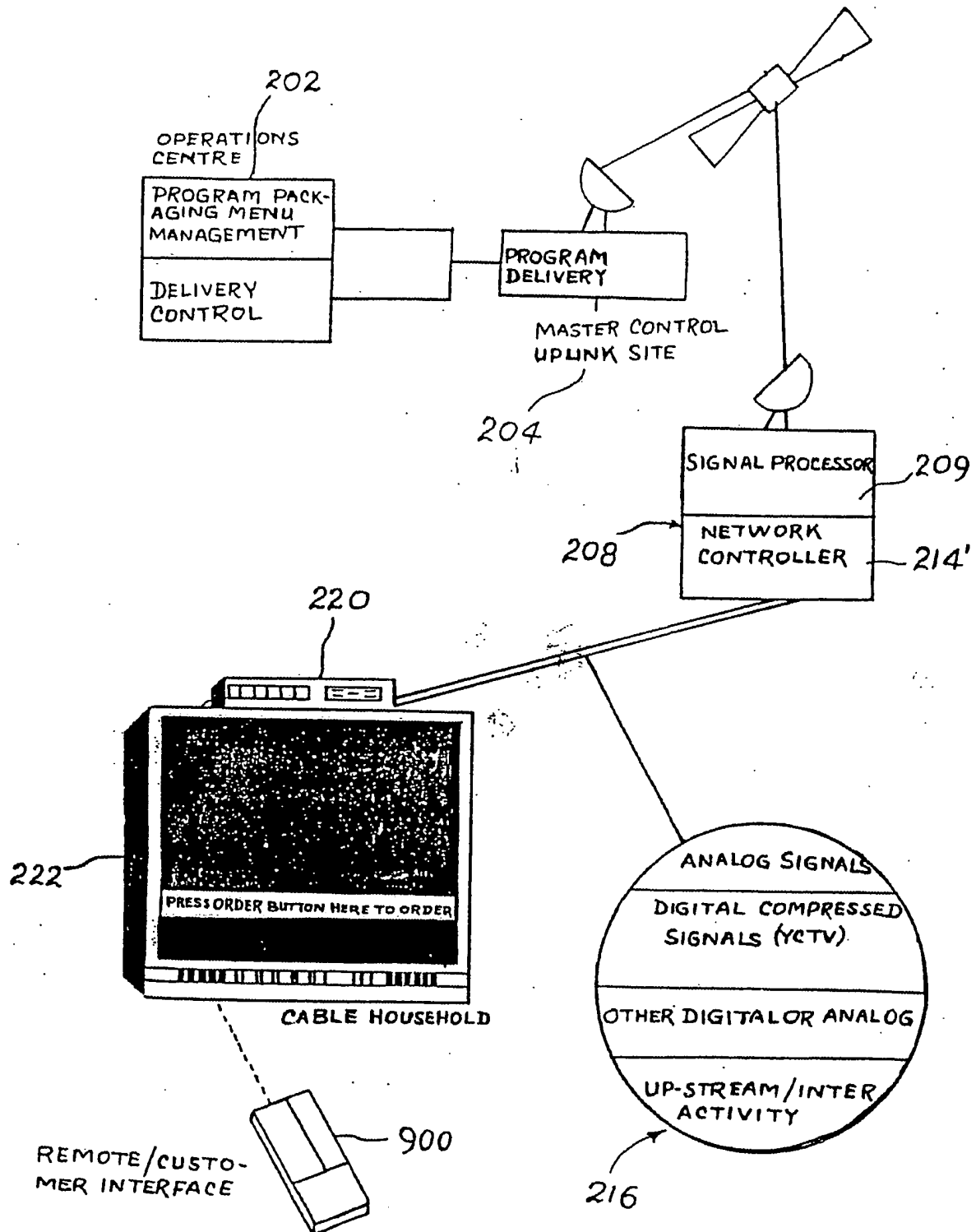


Fig. 3

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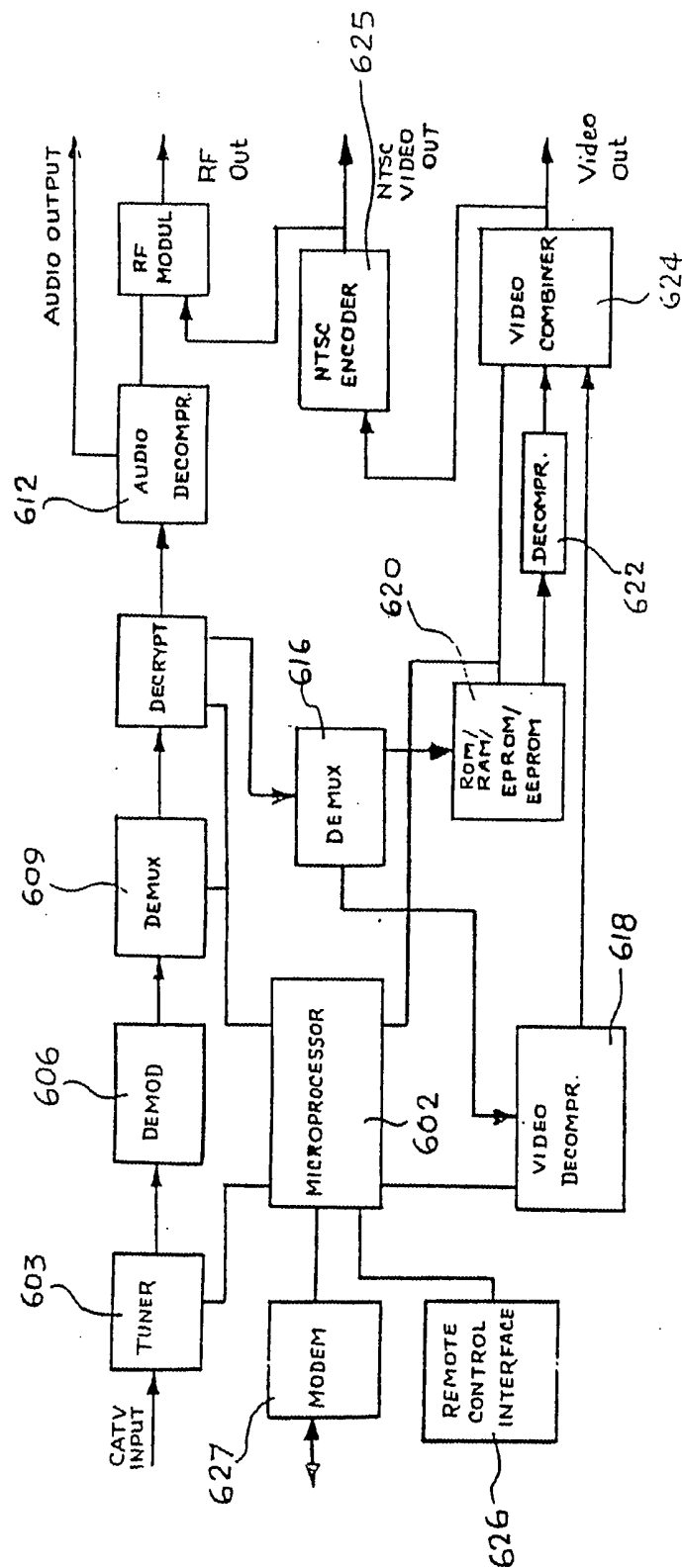


Fig. 4

5/23

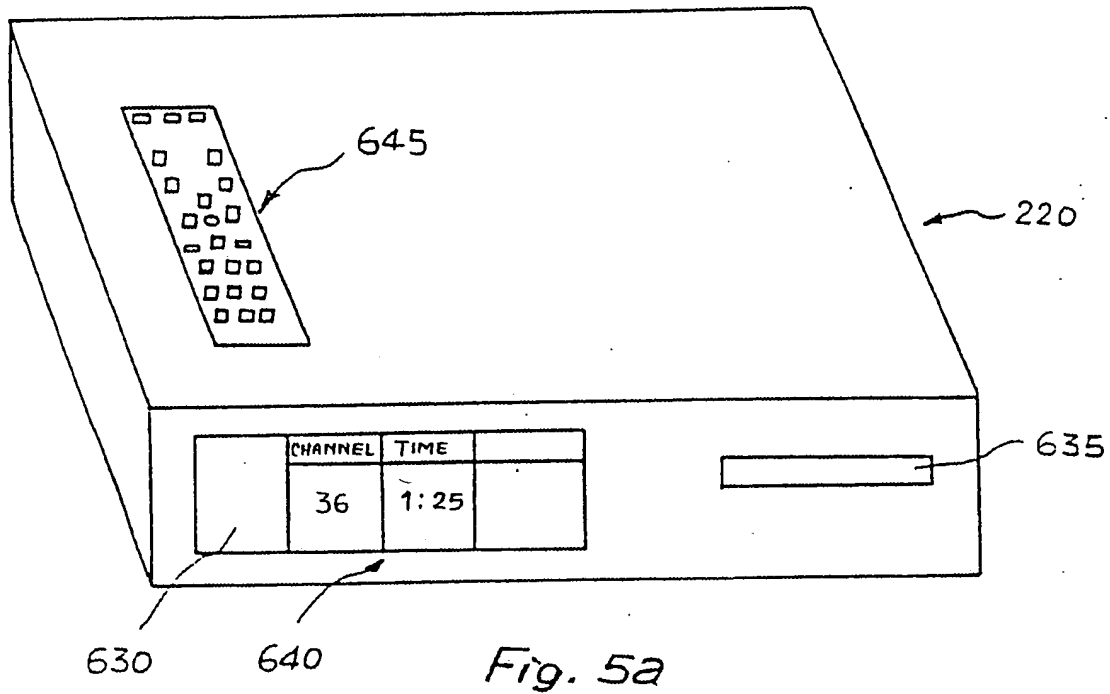
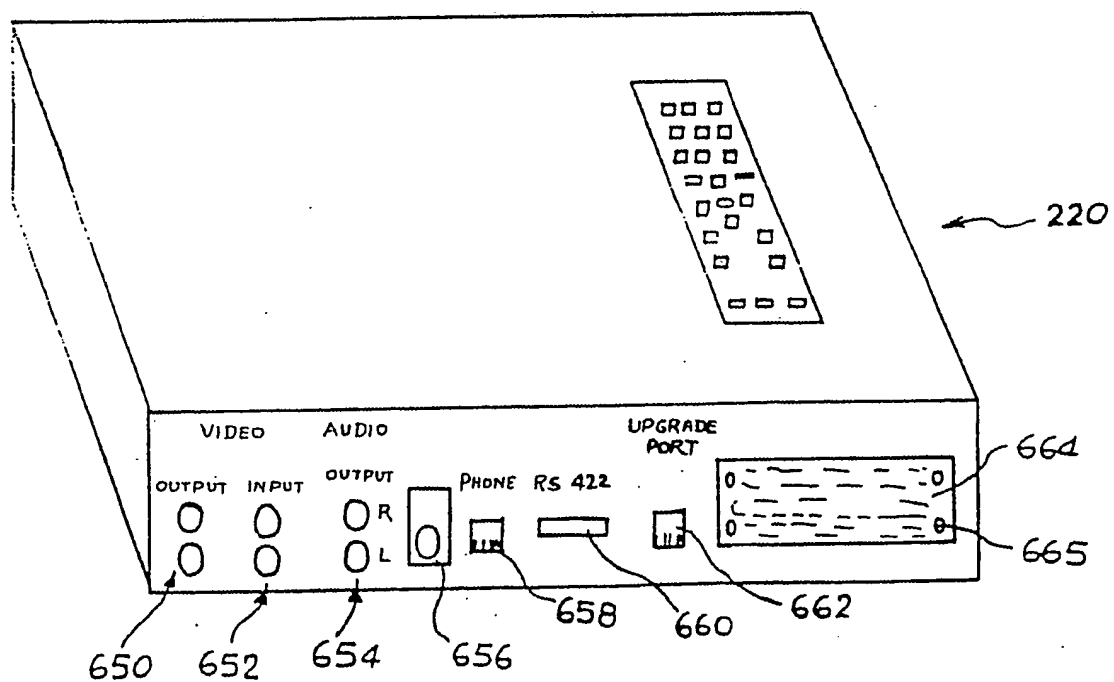


Fig. 5b



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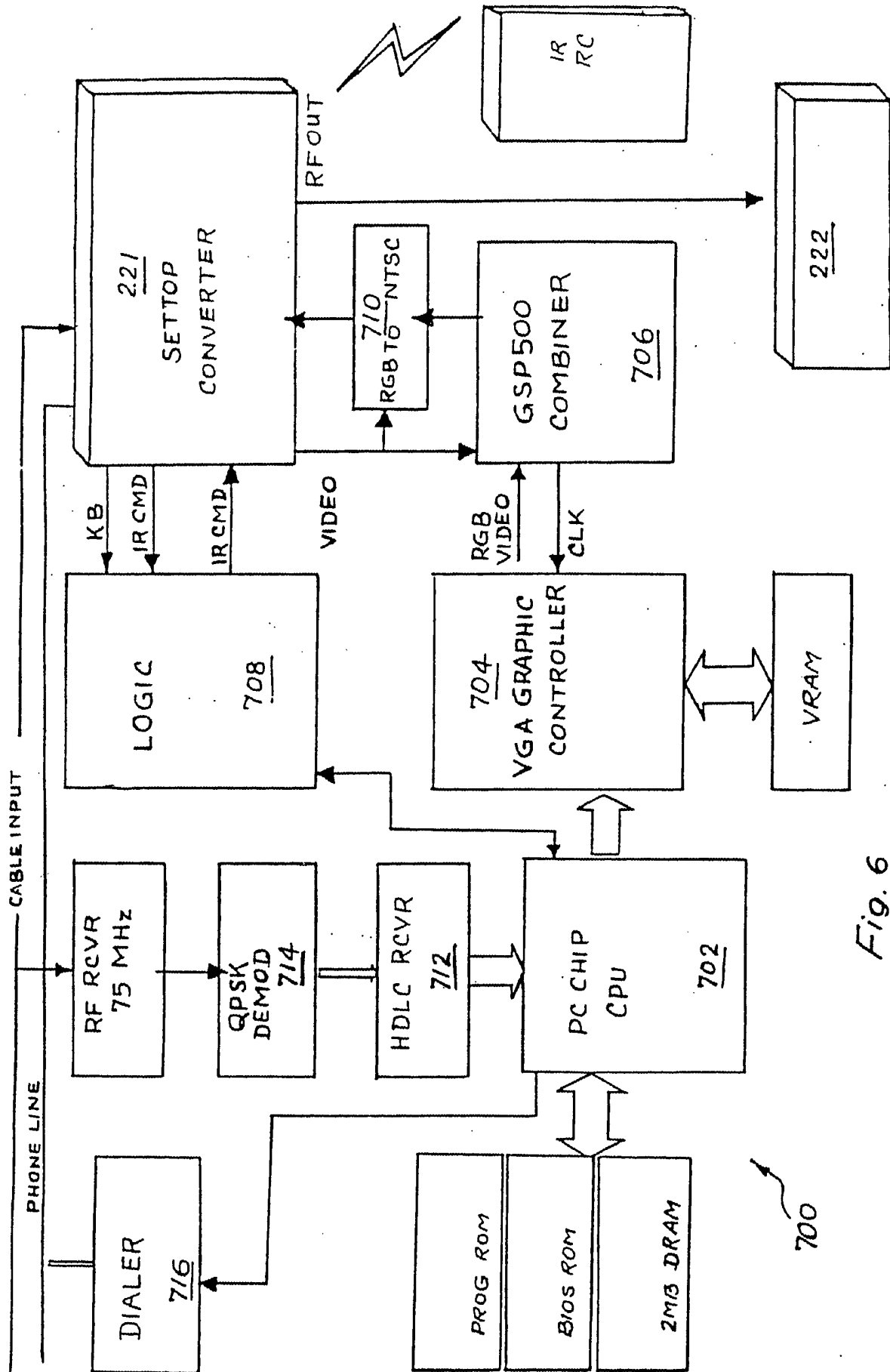


Fig. 6

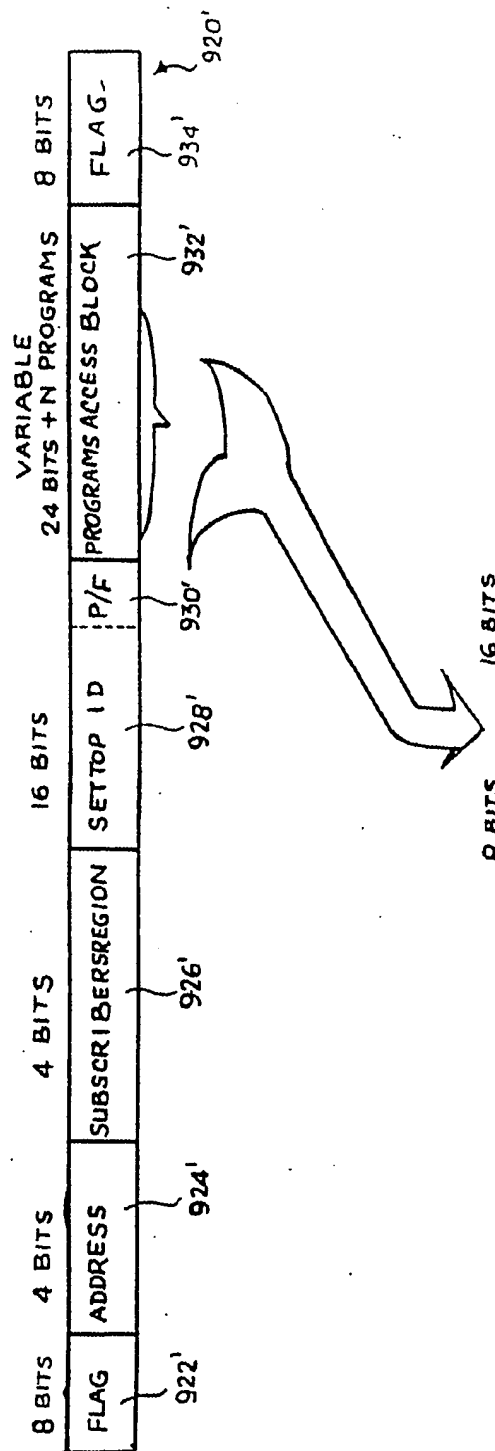
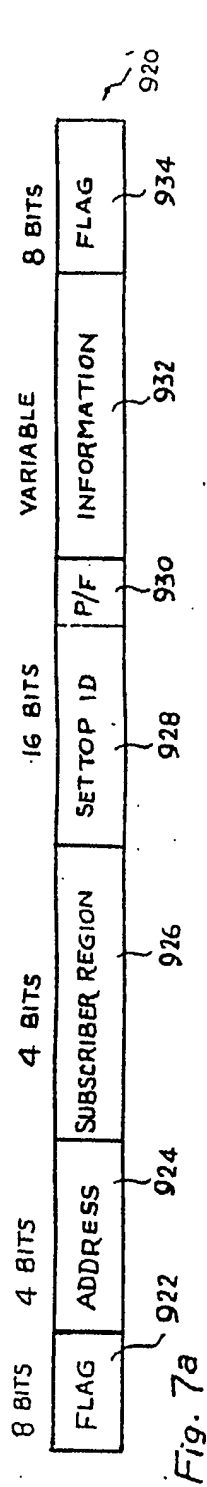
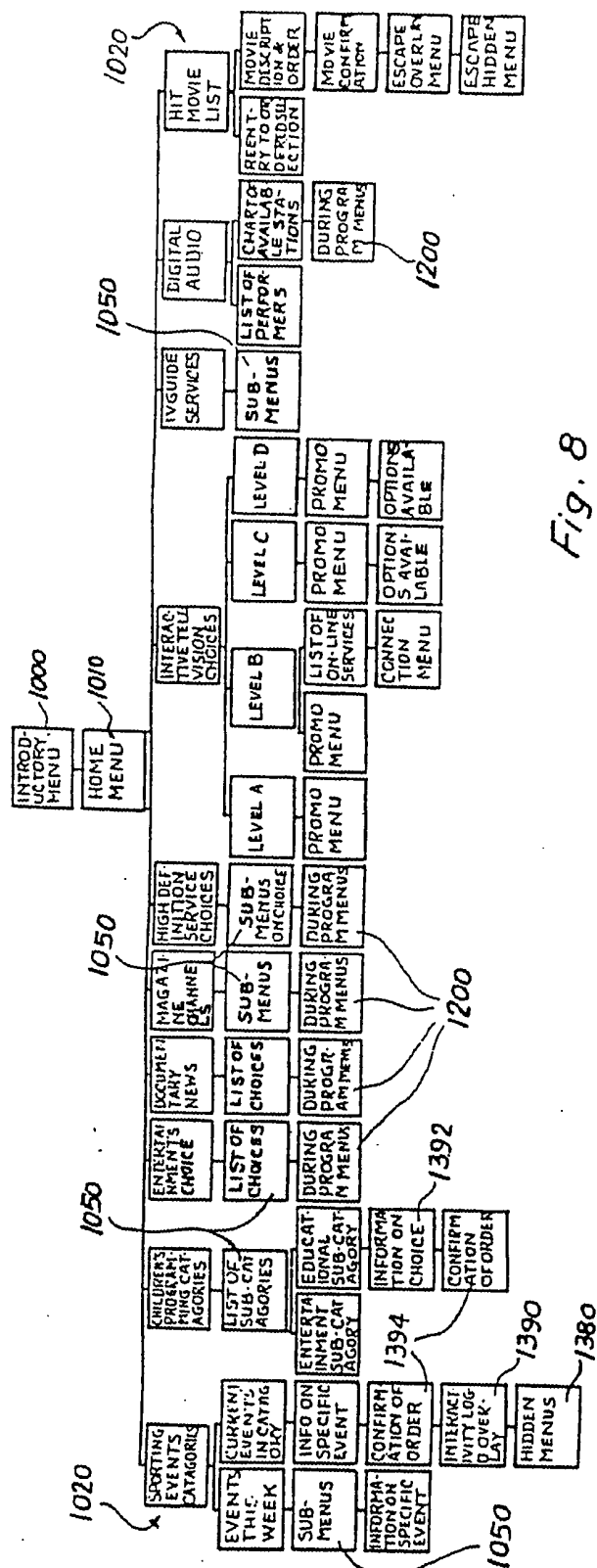


Fig. 7b



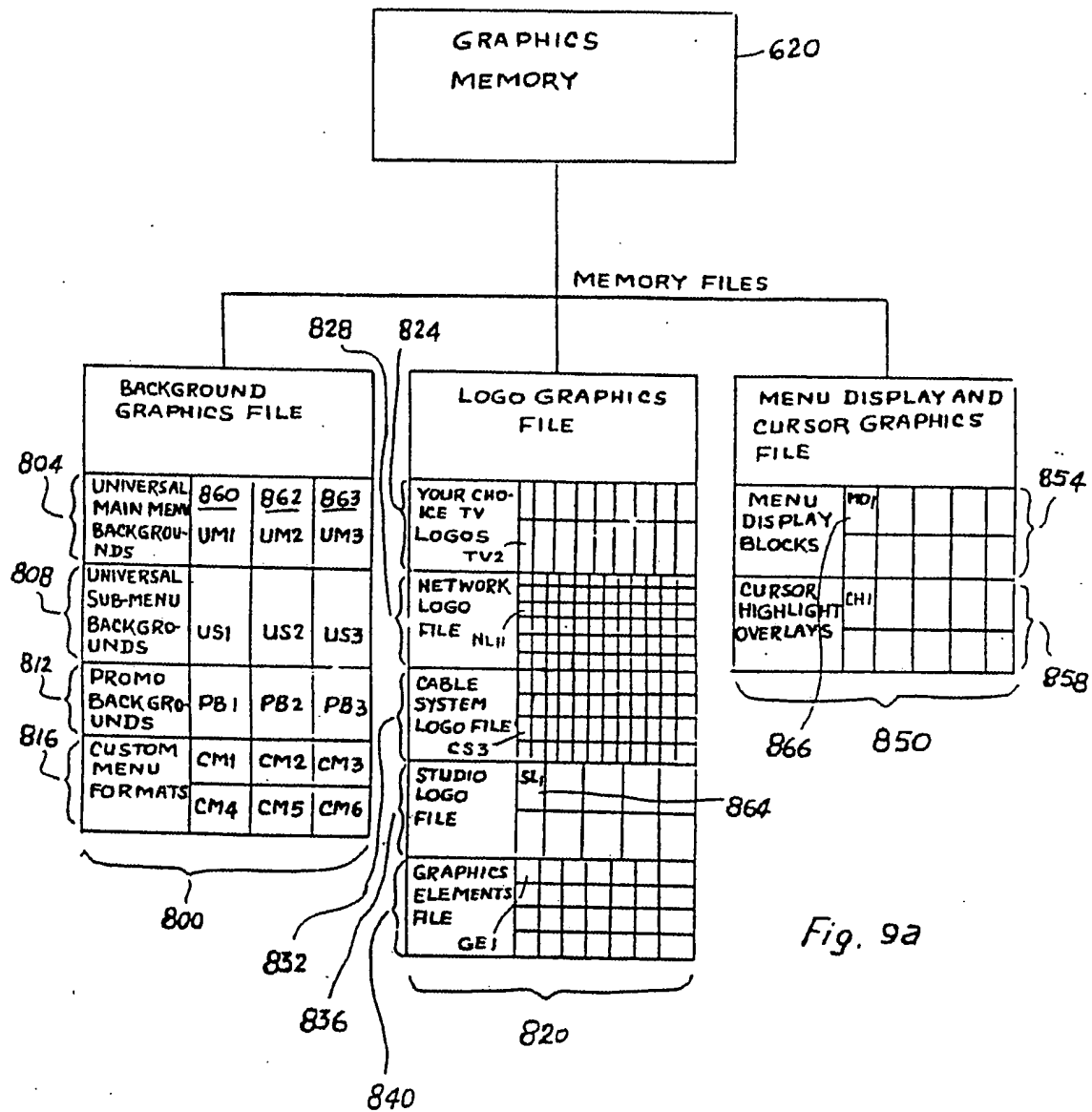


Fig. 9a

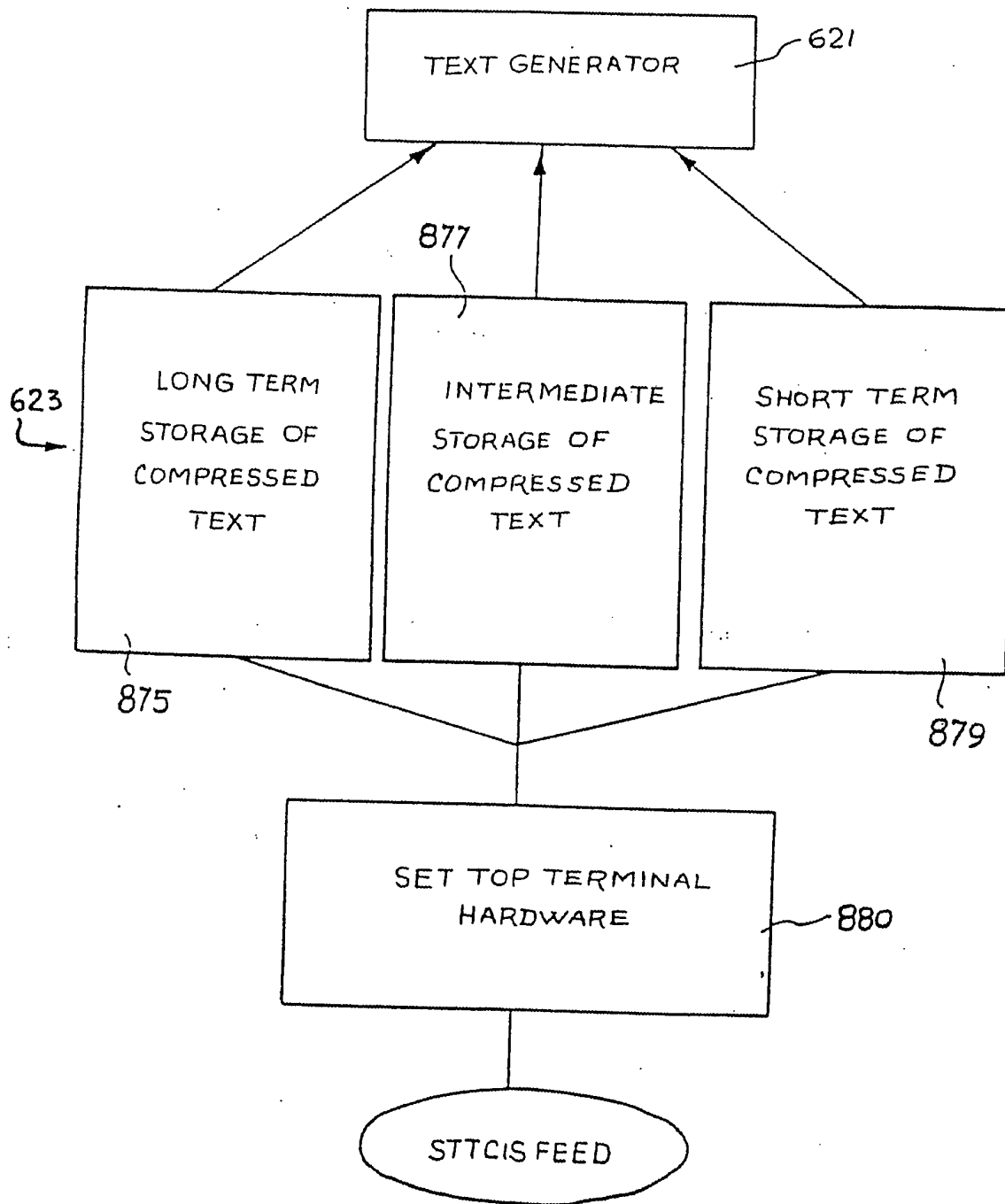


Fig. 9b

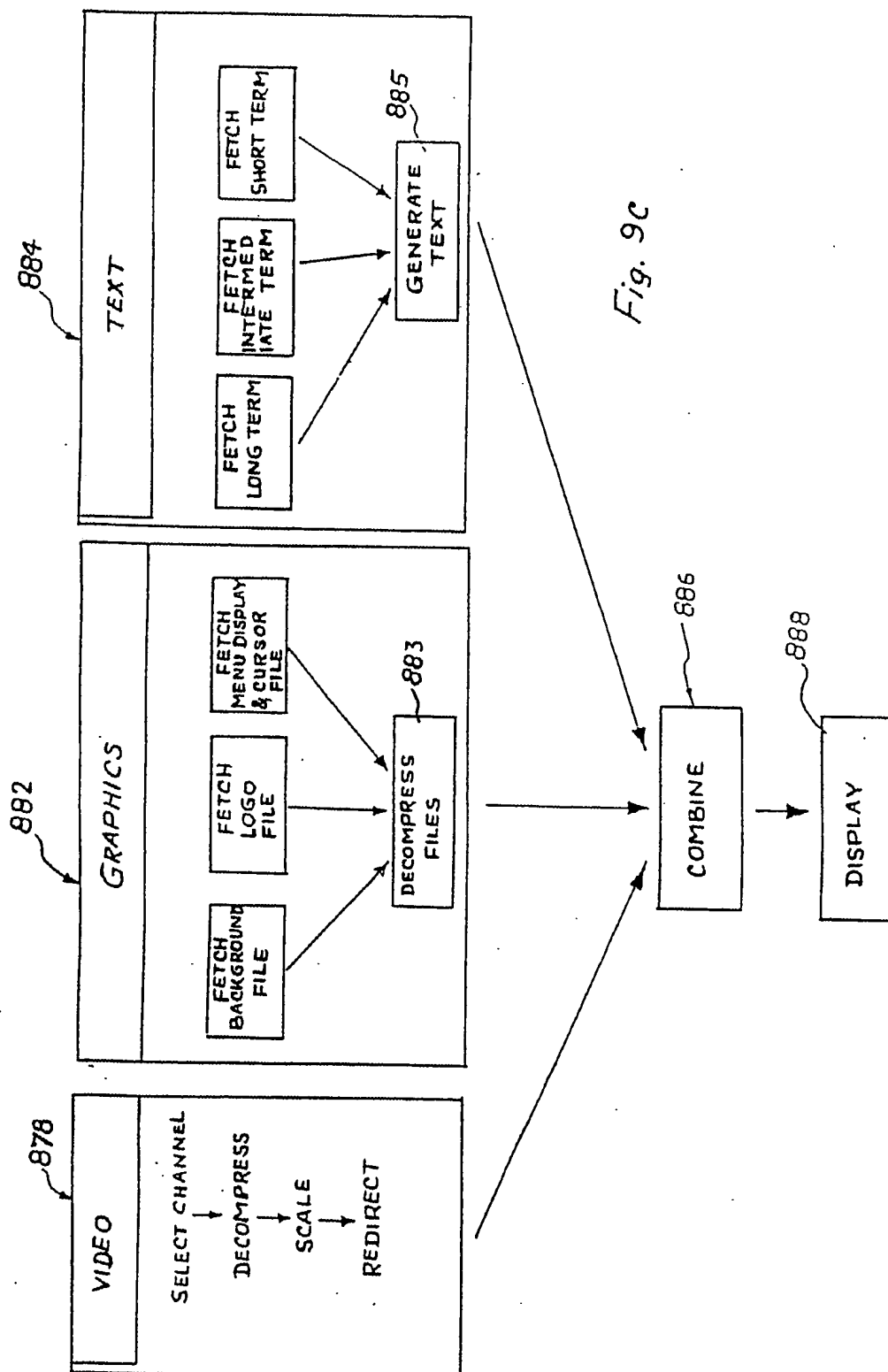
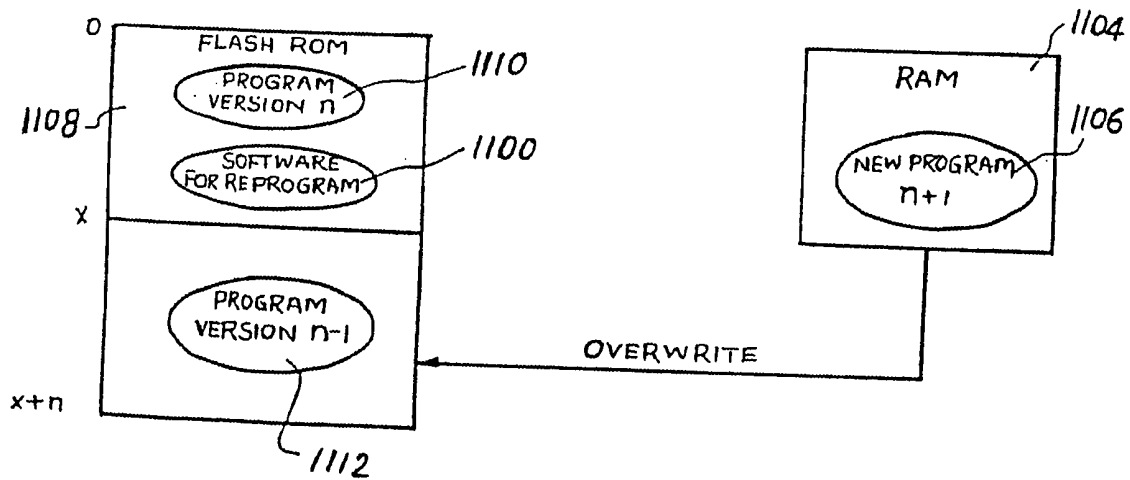
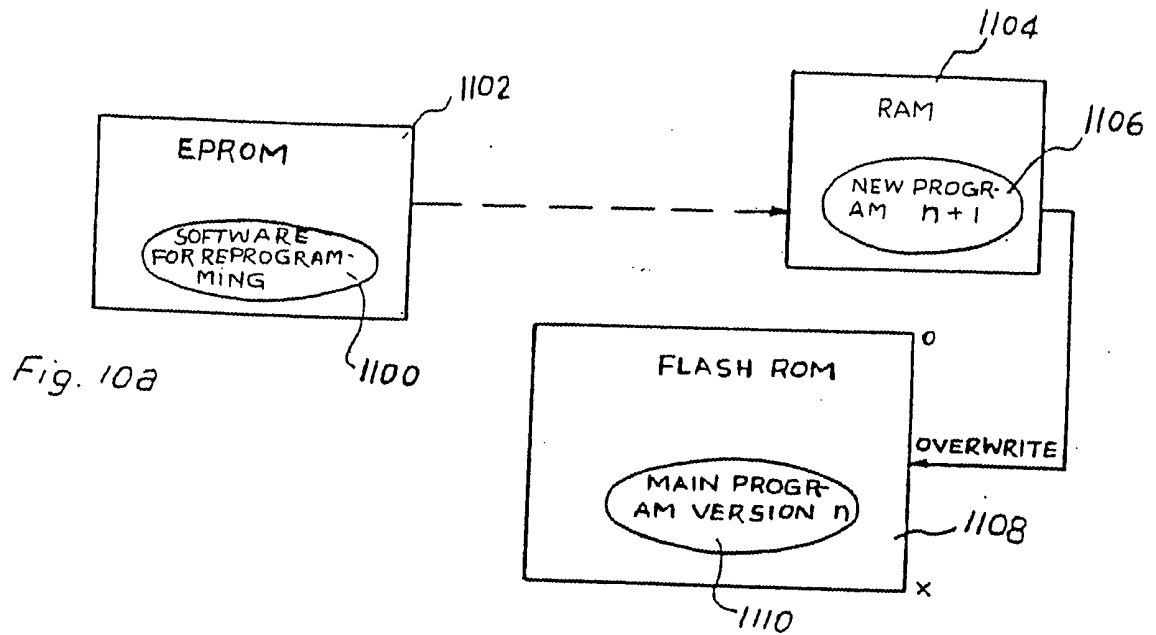


Fig. 9c



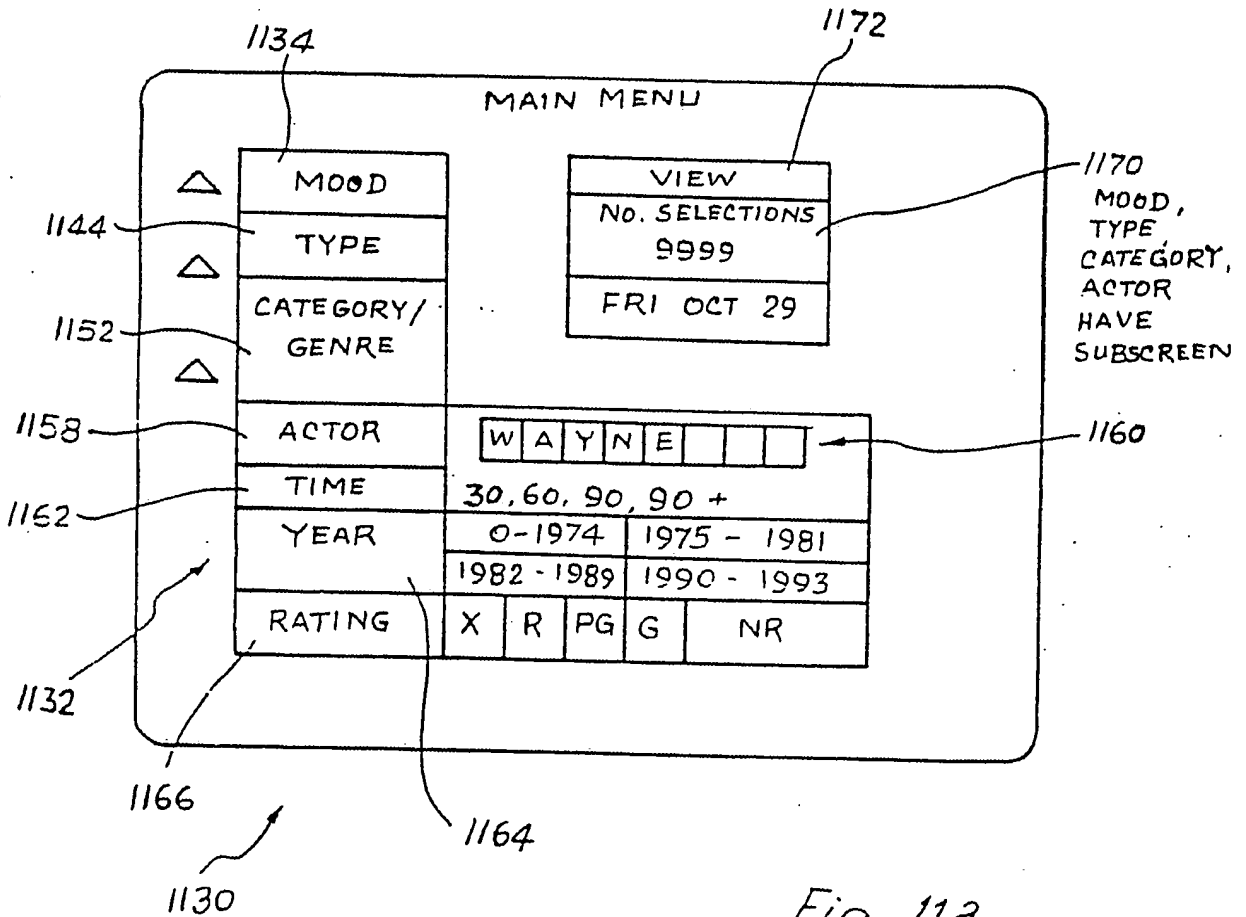


Fig. 11a

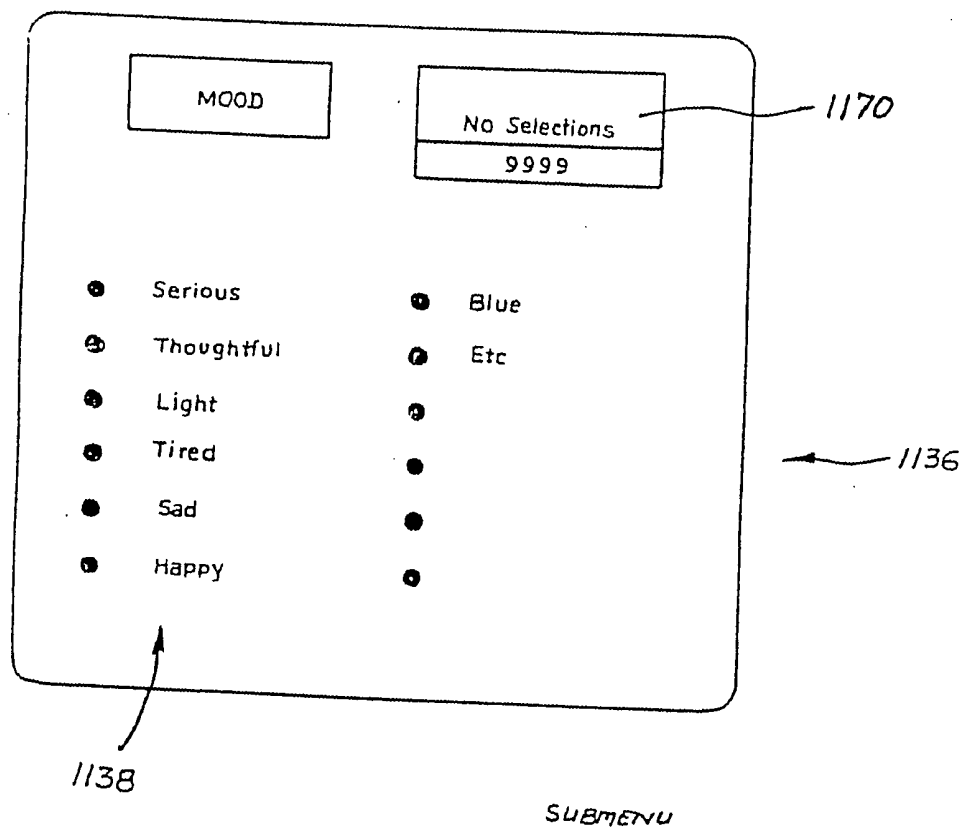
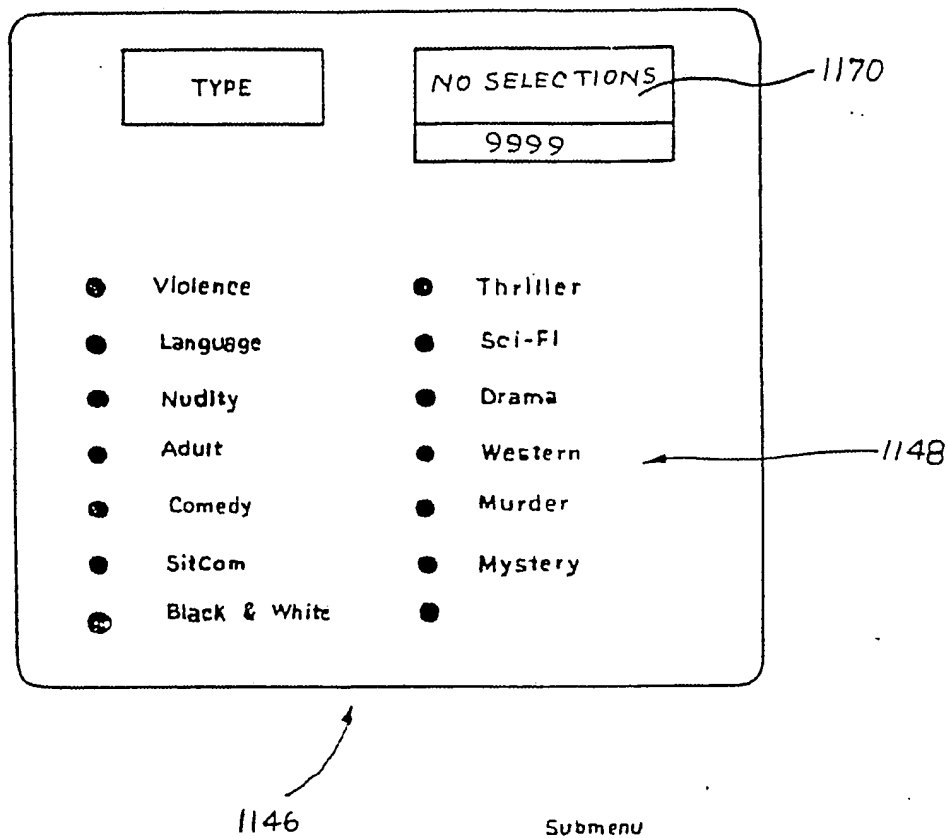
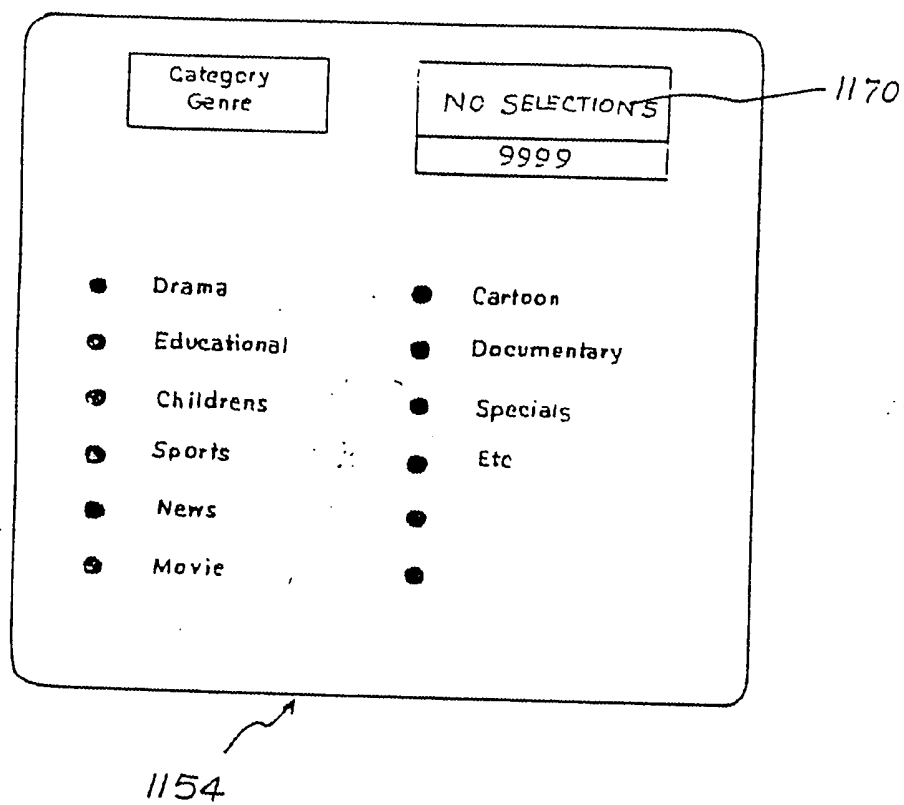


Fig. 11b

*Fig. 11c*

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Category/Genre Submenu

Fig. 11d

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Selection List

1. True Grit
2. Green Berets ▲
3. Rooster Cogburn
4. The Alamo
5. Fort Apache
6. Red River
7. Rio Bravo
8. She Wore A Yellow Ribbon
9. Stagecoach
10. West Of The Divide

MORE ▼

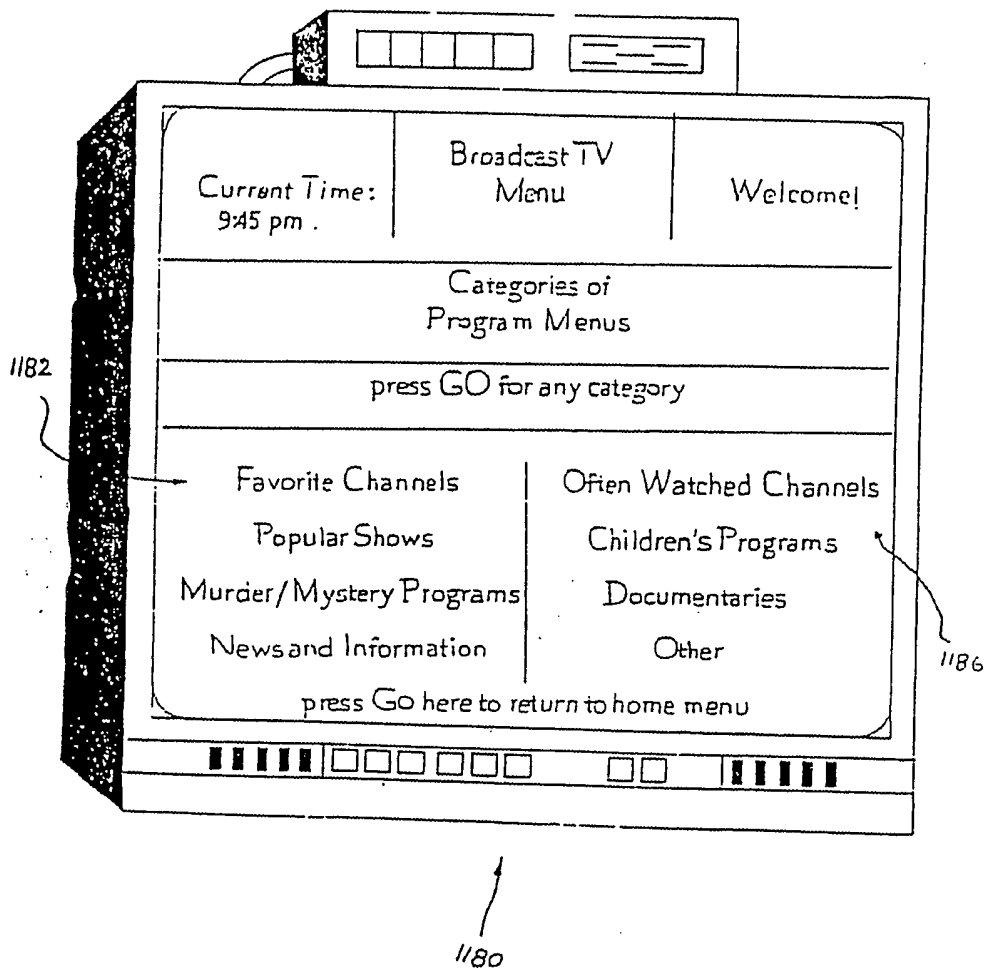
Return To Main Menu

1174

1176

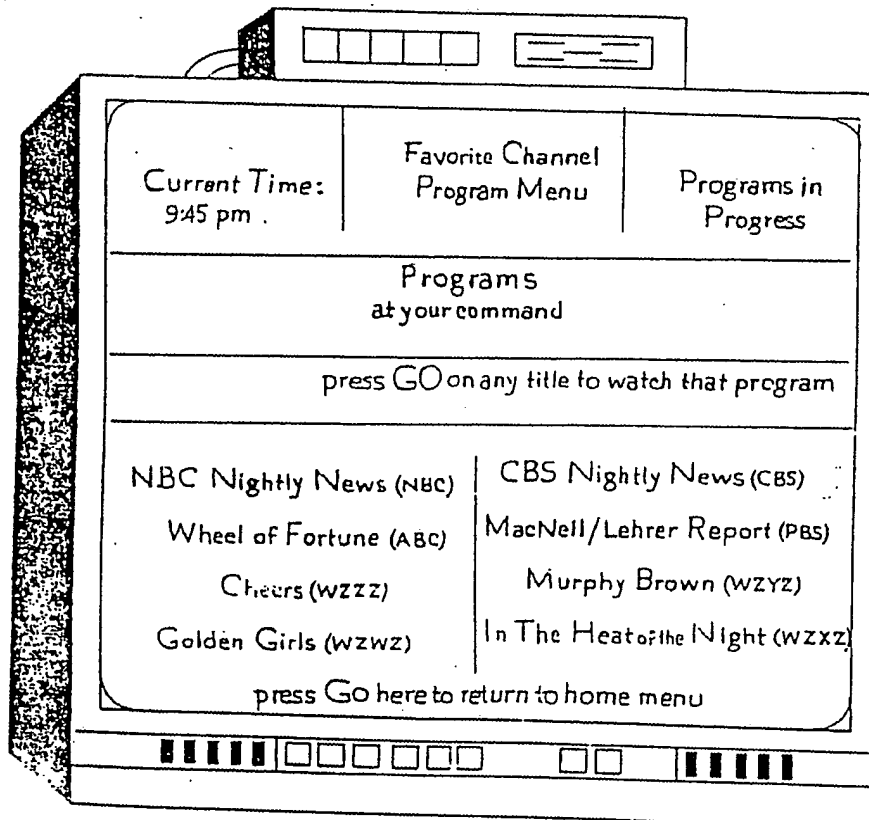
Fig. 11e

Fig. 12a



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Fig. 12b



1184

MOOD QUESTION MENUS

1190 ↗

LENGTH OF PROGRAM DESIRED

Short

Medium

Long

Fig. 12c

1192 ↗

Type of Program Desired

Serious

Thoughtful

Light

Fig. 12d

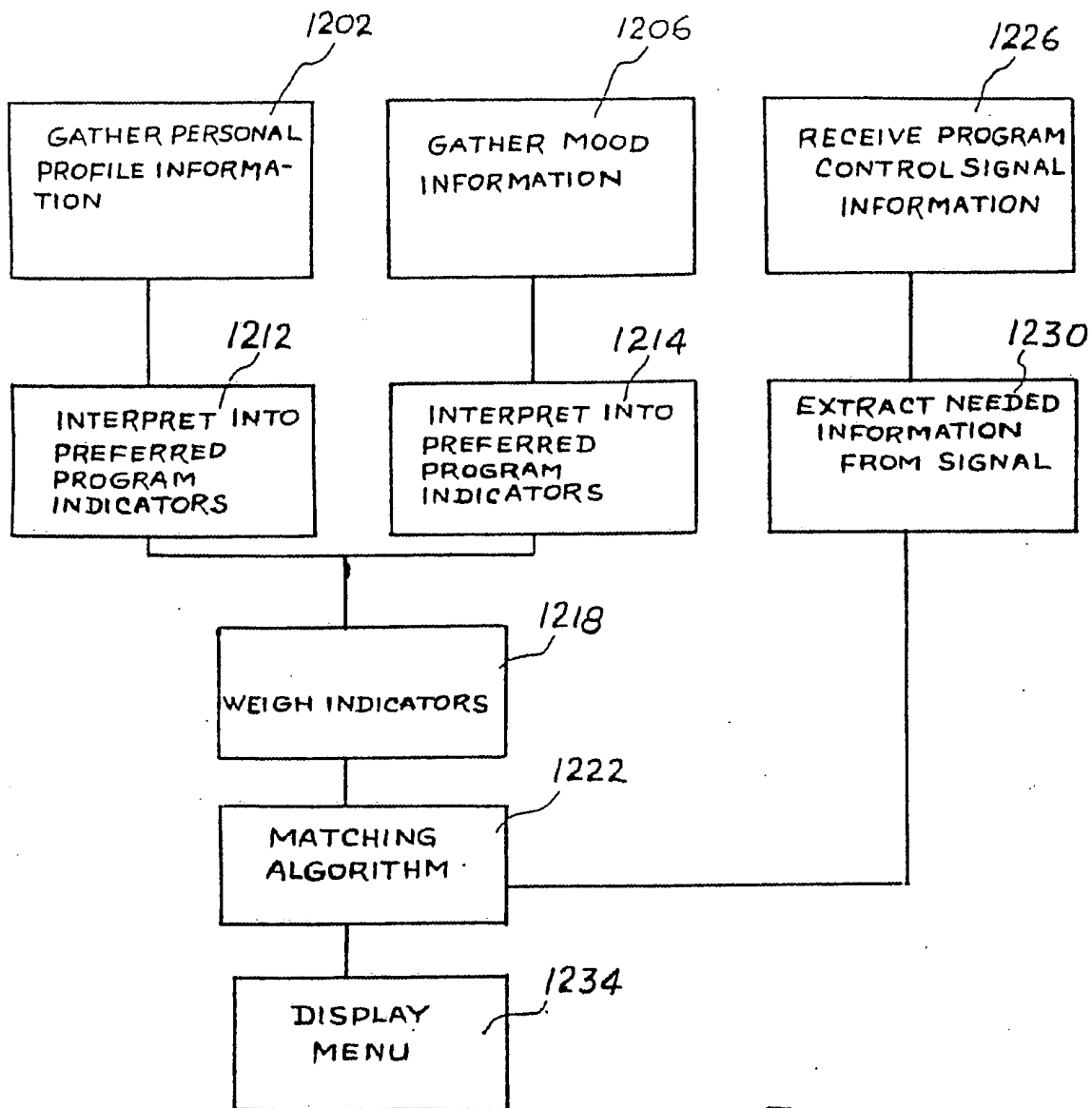
1194 ↗

Do you wish an active or passive program?

Active

Passive

Fig. 12e

*Fig. 13a*

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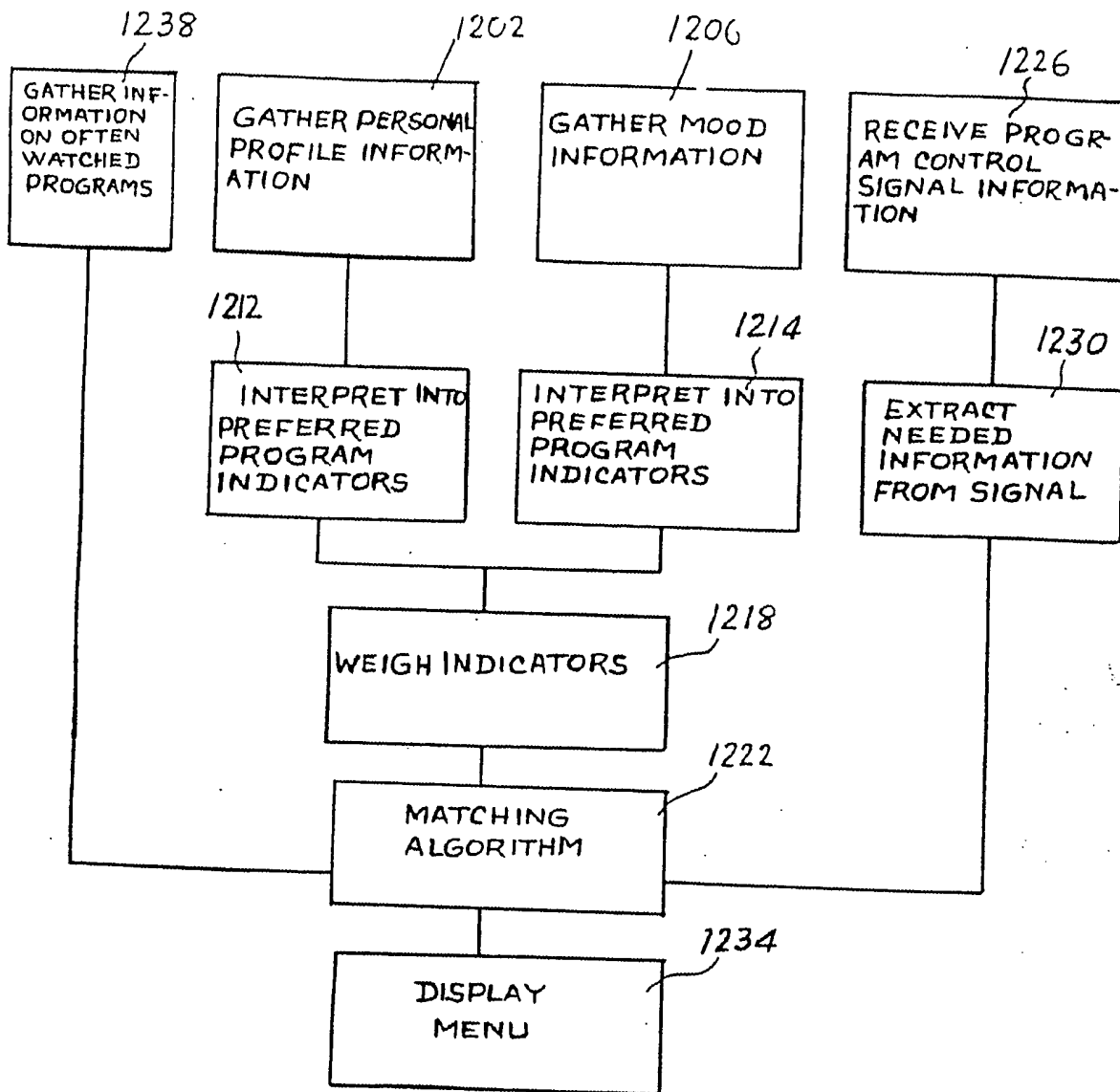
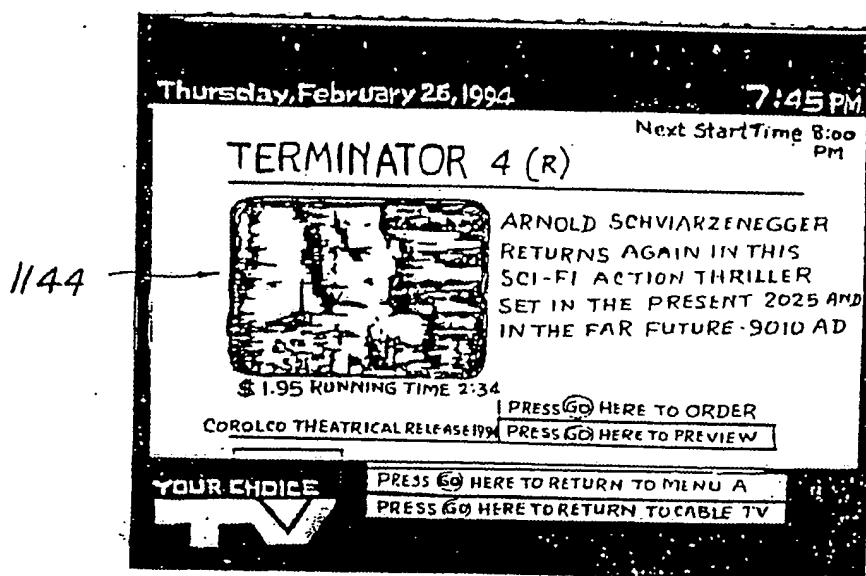


Fig. 13b

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Fig. 14



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INTERNATIONAL SEARCH REPORT

Internat. Application No.

PCT/US 93/11708

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 5 H04N7/16 H04N7/173

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 5 H04N H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO,A,92 17027 (SCIENTIFIC-ATLANTA) 1 October 1992	1,7,9, 16,17, 19-23,32
A	see the whole document	2-6,8, 10-15, 18,24-31
Y	WO,A,91 00670 (THE SUPERGUIDE CORP.) 10 January 1991	1,7,9, 16,17, 19-23,32
A	see the whole document	2-6,8, 10-15, 18,24-31
A	EP,A,0 424 648 (GENERAL INSTRUMENT) 2 May 1991 see abstract	17-19

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

25 May 1994

Date of mailing of the international search report

06.06.94

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Greve, M

INTERNATIONAL SEARCH REPORT

Internat. J. Application No

PCT/US 93/11708

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 506 435 (SCIENTIFIC-ATLANTA) 30 September 1992 see page 14, line 55 - page 15, line 50 ----	22
A	BYTE February 1991 , ST.PETERBOROUGH, US pages 251 - 258 J.REIMER 'MEMORIES IN MY POCKET' see the whole document ----	23-29
A	EP,A,0 402 809 (MAGUS, LTD.) 19 December 1990 see column 4, line 48 - column 11, line 39 ----	1-32
A	WO,A,86 01962 (SCIENTIFIC-ATLANTA) 27 March 1986 see the whole document -----	1-32

INTERNATIONAL SEARCH REPORT

Information on patent family members

Internal Application No

PCT/US 93/11708

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